Colon Classification: A Requiem

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ABSTRACT

This paper lists important publications on classification by S. R. Ranganathan (1892-1972), veritably called the father of Indian library movement. It outlines brief history of the seven editions of his revolutionary colon classification (CC) from 1928 to 1987. Seven editions are grouped into three evolutionary versions. It states the unique features of the CC as based on his deep study of the nature and growth of knowledge, and explains the work of designing a classification system into three successive but demarcated planes of work, namely, idea, verbal, and notional planes. Tools for designing and evaluating a system are enshrined in his 55 canons, 22 principles, 13 postulates and 10 devices. Further, this paper discusses the division and mapping of knowledge, types of subjects, and modes of their formation in the universe of knowledge as envisaged by Ranganathan. Semantic and syntactic relations are enshrined in his PMEST facet formula fitted with rounds and levels of facets, and other principles, such as the famous Wall-Picture principle, for citation order of facets. It also briefly explains facet analysis and number building with its notational base of 74 digits, and concludes with extent of its use and its enduring contribution to the science of classification and its future.

Keywords: Classification, library classification, faceted classification, facet analysis Ranganathan's theory of classification, colon classification, classification design and evaluation

1. INTRODUCTION

Dr S.R. Ranganathan (1892-1972), father of the Indian library movement, was the most prolific writer and librarian of his time. His exemplary dedication and uncanny insights won him the acclaims of his peers the world over. His testament forms the bedrock of the current theory of the discipline. Extensive work on classification he did is epoch-making, and creates a paradigm next in importance only to pioneering work of Melvil Dewey (1851-1931). Views, appeals and research findings, that he communicated through the medium of books, journals, reports, international, seminars and lectures, have pervaded and still constitute the core of our current knowledge of the subject. His books are librarians' lore. His major books on classification are[1]:

- *Colon Classification*. Madras Library Association, Madras, 1933. The last edition done by Ranganathan was the 6th (1959), again issued with amendments in 1963, and published by Asia Publishing House, Bombay. (Now in its 7th Ed., 1987)

- *Prolegomena to Library Classification*. Madras Library Association, Madras, 1937. (Now in its 3rd Ed.) (1967) published by Asia Publishing House, Bombay. Its 2nd Ed. (1957) was brought out by the Library Association, London.

- *Library Classification: Fundamentals and Procedures*, with 1,008 graded examples and exercises. Madras Library Association, Madras, 1944.

- *Elements of Library Classification*. NK Publishing House, Pune, 1945. (Now in its 3rd Ed., 1967), published by Asia Publishing House, Bombay.

- *Classification and Communication*. University of Delhi, Delhi, 1951.

- *Philosophy of Library Classification*. Ejnar Munksgaard, Copenhagen,1951.

- *A Descriptive Account of the Colon Classification*. Graduate School of Library Science, Rutgers State University, New Brunswick, N.J., 1965. (Published again in 1967 in India by Asia Publishing House, Bombay).

2. BRIEF HISTORY OF COLON CLASSIFICATION

The colon classification (CC), conceived and developed from 1924 to 1928, was first published by the Madras Library Association in 1933. The latest and the first edition published after the death of Ranganathan was the 7th in 1987.

Being a mathematician and a close student of an inspiring teacher WCB Sayers (1881-1960) in the School of Librarianship and Archives, University College, London, classification studies attracted him most. In his later work he perceived many similarities between classification and mathematics. At the same time practical classification by the DDC did not slake his orderly mind. That being a mark and park system, he could assign more than one class number to a document — especially enshrining compound and complex subjects. For example 'Anatomy of Flowering plants' could either be given the class number of 'Plant anatomy', or 'Flowering plants'. It was an option by default for all such compound subject. This defeated the purpose of classification itself. Besides this, Ranganathan also found only a nominal representation of Indian subjects in the scheme. WASPish bias in Dewey's system is too well known, even today.

First, he realised that the aftermath of World War-I (1914-1919) had brought in its wake the emergence of specialised, micro and interdisciplinary subjects which the existing classifications failed to cope with. He diagnosed that the DDC due to its enumerative nature was a classification suited to the 19th century linear kind of literature. In 1924, Ranganathan happened to visit Selfridge's departmental store in London, and keenly watched a demonstration of a Meccano toy kit. The salesman was making different toys from the same kit by permutation of the blocks, strips, nuts, and bolts. That triggered his mind to adapt similar technique to design different class numbers from same subject concepts to suit the individually documents. And that idea clicked which later brought a paradigm shift in classification theory, practice, and research. He visualised that all knowledge is comprised of some basic and discrete concepts, which could be combined to construct class number to specifically suit a document, instead of assigning it a predetermined readymade class number. Connecting symbols in the form of punctuation marks served his nuts and bolts. Sayers at once commended the idea of a new technique, but also warned him of labour and patience required for the huge task ahead. Back home in 1925, as the first trained librarian of the Madras University, he applied his scheme to the library, and gained long and single handed experience of its development and application. It was first published in 1933 by the Madras Library Association (founded in 1928) of which Ranganathan was the founder General Secretary. Second edition published in 1939 was important as it clearly laid down the theory and methods of CC as already published in his magnum opus, the 'Prolegomena to Library Classification' (1937). Third edition came out in 1950 when he had migrated to Delhi University. There he attracted a band of young and faithful follower librarians who considerably furthered research in classification and applied his systems and methods in their libraries. It was widely adopted in Delhi libraries. It led him to delve at somewhat more abstract level of his classification theory published in conference volumes and serials of the Indian Library Association of which he was the president. After a long experience and constant quest to generalise the various facets, Ranganathan in 1952 came out with his famous but debatable theory of "five and only five fundamental categories in the universe of knowledge". In the earlier editions the facets were named variously in different main classes. In the 4th edition these were named as Personality, Matter, Energy, Space, and Time, well known as PMEST. Nevertheless, it was a masterstroke in generalisation of facets, and is considered as the least number of categories for any bibliographic classification, so far. The 5th edition (1957) was proposed in two volumes of basic and depth versions, but only basic version was published. By the time 6th edition in 1960 was published the CC had reached its pinnacle of glory brought by the international conference on classification study and research at Dorking, England in 1957. The Classification Research Group (CRG, London formed in 1952) declared its manifesto of faceted classification as the basis of all future information retrieval systems. Philosophy and method of facet analysis got wide acceptance, though only a few believed the doctrine of 'Five and only five fundamental categories'. The term facet was used differently by different scholars and classification schemes. The 6th edition (1960) later issued with amendments (1963), remains most popular, used and stable edition. It is the one taught in all Indian library schools. The 7th edition published after the death of Ranganathan in 1987, edited by his long time research assistant Professor MA Gopinath, was found confusing and inconsistent in structure and notation. It is no exaggeration to say that it been discarded by the Indian library profession. Nevertheless, it brought many metamorphic changes in basic subjects, categories, common isolates, and notation[2].

3. VERSIONS

Gopinath[3] conveniently divides all the seven editions into three versions in the line of evolution:

3.1 Version 1 (1933-1950): Rigidly Faceted Era

During this period the facet formula was rigid and pre-determined. Colon was the only connecting

symbol for all the facets. That is until the fourth edition (1952) only connecting symbol was the colon; even the absent facets had to be indicated by the dummy colons, e.g., 2:::N 'Libraries in 20th century'. Here the first two colons indicate the absence of matter and space facets, the third is the connecting symbol for the Time facet, i.e., 20th Ccentury. It made the class numbers unwieldy, and even slippery. An extra colon could land the book in an alien place, thus misplacing it.

3.2 Version 2 (1950-1963): Analytico-synthetic Era

As said earlier, the fourth edition became a milestone with the postulation of the five fundamental categories and generalising them as concretely as PMEST. Each category was indicated by a distinct connecting symbol. Hence the absence or presence of any category was self or automatically indicated. For example, the above class number was denoted as 2'N, ' apostrophe being the indicator digit for Time. It means all other categories; namely, P, M, E, and S are absent. It brought simplicity and brevity in notation.

3.3 Version Three (1963-1987): Freely-faceted Era

This period was devoted to the close study of the properties and structure of the universe of knowledge. Splitting the Matter category into three kinds, discovery of new facets, concept of speciators, development of highly hospitable sector notation led to declare it as a freely-faceted analytico-synthetic scheme, which is a sort of a self-perpetuating scheme. A self perpetuating system is one which needs least revision. The new version has a virtually infinite capacity to incorporate new subjects at their proper places with the help of hospitality devices for creation of new isolate numbers. The CC is a truly postulate-based analytico-synthetic classification as well as a highly-faceted classification. But history has proved that no classification can be self-perpetuating.

4. FEATURES OF COLON CLASSIFICATION

The CC is a general scheme, which aims to classify by discipline all subjects and all forms of documents — books, periodicals, reports, pamphlets, microforms, and electronic media in all kinds of libraries. For bibliographic records, requiring depth classification, it is especially suitable. Scheme is described as analytico-synthetic which implies that it does not go in for making any exhaustive list of all possible subjects known at a time, as was usually done in those days. This objectively formulated and dynamic theory is enshrined comprehensively in his 'Prolegomena' (1937/1957/1967). For designing a classification system, Ranganathan divided the work into three successive planes. Idea plane is

the message, verbal its expression; notational plane its visible representation in short hand symbols.

4.1 Three Planes of Work

Prior to Ranganathan classification design was considered as an intuitive field of a few inspired geniuses. This is quite obvious from the work of Melvil Dewey (1851-1931), CA Cutter (1837-1903) and JD Brown (1862-1914). HE Bliss (1870-1955), who was singularly dedicated to classification studies, did base his 'Bibliographic Classification' (1944-1953) on some concretely formulated principles. Though the first edition of the CC was mostly based on intuition, and elusive principles, but Ranganathan soon crystallised the unconscious theory that went into making of his CC from 1928 to 1933. The theory was precipitated in his magnum opus 'Prolegomena to Library Classification' (Madras Library Association, 1937). Through comparative approach and by identifying the best practiced in existing systems, he formulated whole panoply of canons and postulates for designing and evaluating classification systems. In 1950 a great breakthrough was achieved in the design of classification by dividing it in three succeeding phases, called Planes:

(a) Idea plane,

(b) Verbal plane, and

(c) National plane.

Guided by the overarching Five Laws of Library Science (1931), the work in each plane is executed by 55 Canons, 22 Principles and 13 Postulates – Ranganathan makes clear distinction between these terms[4]. In addition there are ten Devices to improvise notations for non-existing concepts in the schedules.

4.1.1 Idea Plane

It is a thinking, policy, and decision making phase. It is a paramount plane. The quality of work done here will determine the quality of the ultimate product. Here is made intellectual analysis of the subject; characteristics are selected to break a subject into categories facets and ultimately into isolates arranged discretely and systematically into arrays and chains. An 'isolate' is the smallest unit of knowledge in the CC; whereas a 'facet' is a group of isolates obtained by the application of a single characteristic. The type and quality of characteristics, and the order in which these are to be applied is determined by Canons of Characteristics. These canons mandate that characteristic chosen as the basis of division should be relevant, objective, and permanent; characteristics should be applied in order of general to specific and one at a time.

Once facets and their isolates are formed with the application of characteristics, the next set of canons is to arrange terms in arrays and chains. An array is a set of entities of equal rank arranged in a

systematic order. For this, Ranganathan formulated rules for formation of arrays of entities. These are: 'Canon of Exhaustiveness' that is an array should be inclusive of all the classes. 'Canon of Exclusiveness' lays down that an entity should belong to one and only one array—it will avoid cross-classification. This is only required for shelf classification. For classifying databases and designing OPACs cross-classification is a boon. 'Helpful sequence' canon means that facets and isolates should be arranged in a predetermined logical sequence but one which is expected by the majority of the users. Historical events should be chronological, while UN member states can be in alphabetical order; living species may be arrayed in the order of their evolution; chemical elements can be arranged by their atomic numbers. Geographical entities can be arranged by the 'principal of spatial contiguity'. Coins can be arranged by their face value. He discovered eight options to arrange entities in a helpful order. Chain is a sequence of entities in a constantly decreasing order of their extension. World--Asia--South Asia--India--North India--Delhi is a chain of classes. The 'Canon of Decreasing Extension' means chain should move from 'broader to narrower' or 'general to specific classes'; and 'Canon of Modulation' means no link in the chain should be missed. Division should be gradual and finely calibrated. In the above chain, we should not jump form India to Delhi omitting North India. At the end of the work here we have a finely woven and exhaustive network of all concepts. But still all is nebulous.

4.1.2 Verbal Plane

Then the theater moves to the verbal plane—to articulate the findings of the idea plane in an unambiguous language. Language is the dress of thought, aptly said Dr Samuel Johnson (1709-84), so believed and acted Ranganathan who always exhorted librarians to learn and use technical terminology. Terms used to express a science should be current and free of homonyms and synonyms making an utopian ideal of one to one correspondence in concept-term relations. Ranganathan laid down that terms used for classification systems should be made free of homonyms and synonyms, and must be expressed and read in their context; and mostly should be neutral not opinionated or critical. Latter means a classification should not be value-ridden. As an example, classification systems should not use the terms major/minor authors to categorise them, as Dewey did in his 14th edition. Ironically, the terminology in the CC is now quite dated, which poses problems in chain-indexing.

4.1.3 Notational Plane

Of the three planes, it is the most visible plane. Ranganathan expected much from a notational system in terms of capacity and sophistication to represent complex ideas. He vainly aspired that the notation should faithfully and comprehensively translate the subject of a document in a language of ordinal digits. For him classification is also a sort of translation. He overloaded it with work but relegated it as servant of the idea plane. However, he lays down that notation in a class number should be brief, simple easy to write, remember (for a short time) and pronounce. It should be expressive of subject structure (both hierarchical and faceted), and above all it should be hospitable to the new subjects. Latter quality in Raganathan's notation is in abundance —got at a high price of being unwieldy and too complex. Considered a high water mark in the development of library classification notations, his notation is highly mixed, uses decimal, sector and group notation. It is hierarchical, extremely hospitable which transparently depicts the facets and categories. Above all his notation is highly mnemonical even to the seminal level–i.e., unity, God, world are always denoted by 1; diseases and mechanical breakdown will get the same number, so will do cures and repairs in different main classes; whereas G; 3, I; 3, K; 3, and L; 3 represent general, plant, animal and human physiology, respectively. Ultimately, it is frighteningly complex and much advance of its time for shelf classification. It is quite suited for computerised databases.

5. NOTATIONS

The notation in the CC-7 comprising of 74 digits (60 semantic and 14 indicator digits) has been divided into the following six species[5]:

A/Z (Roman capitals)	26
Δ (Greek Delta)	01
0/9 Indo-Arabic numerals	10
a/z Roman smalls (i, l, o excluded)	23
Indicator digits with anteriorising value * " ←	03
Ordinary indicator digits &'. : ; , - = → + ( )	11= 74

The notational base of the CC is the widest ever in any classification system. On this count, the CC-7 notation is wide-based, thus very spacious and accommodating, though it has made the notation and consequently the system quite complicated.

6. DIVISION OF KNOWLEDGE IN CC

The CC presumes the entire body of knowledge woven in a system vis-à-vis, sees an underlying unity in it. All knowledge is one he learnt from the Vedas (1500 BC). The structure that ultimately emerges from the CC is both traditional and revolutionary. But it is not Vedic or Eastern. The fact that Ranganathan recognises and honours the existence of time-

honoured main and canonical classes, makes his scheme look steeped in Western disciplinary tradition. Ranganathan identified three types of subjects in the universe of knowledge: Basic, Compound and Complex analogous to chemical substances. 'Basic subjects' are unitary subjects, such as Physics, Thermodynamics, Economics, Marxian Economics, Music, Law, and Library Science. 'Compound subjects' are basic subjects with subdivisions or additional facets, e.g., Velocity of light, Transport economics, Guitar music, or Law of marriage, and Libraries in India. Compound subjects are virtually infinite in number. 'Complex subjects' are mostly interdisciplinary in nature, e.g., Mathematics for engineers, Russian for librarians, or Comparative physiology. Ranganathan postulated that every subject, be it of any type or level, has a basic subject which forms the first facet in constructing a class number.

6.1 Basic Subjects

Ranganathan further divided basic subjects into:

1. Main basic subjects

2. Non-main basic subjects

And further divided them into ten species. On the basis of their modes of formation the following 10 types of basic subjects have been identified.

    1.   Main basic subjects
    1.1 Traditional (Law, Physics)
    1.2 Newly emerging (Library & Inf. Sc.)
    1.3 Fused (Biotechnology)
    1.4 Distilled (Research methodology)
    1.5 Subject bundles (Ocean sciences)
        Agglomerates (Social sciences)

    2.   Non-main basic subjects
    2.1 Canonical classes (Algebra, Geometry)
    2.2 System constituents (Marxian economy)
    2.3 Environment constituents (Desert farming)
    2.4 Special constituents (Gerontology)

6.2 Complex Subjects

A 'complex subject' is a two-phased subject depicting mostly interdisciplinary relations. Six types of phase relations have been identified:

These relations can occur at three levels:

(a) Between two main classes for interdisciplinary subjects (e.g., Chemistry and Physics), (Phase relation);

(b) Between two facets of the same category (e.g., Islam and Hinduism) (intra facet relation), and

(c) Between two isolates of the same array within a facet (Catholics and Protestants), (intra-array relation).

Therefore, there are 6 x 3 = 18 relations in all. The number of relations does not seem comprehensive, but it should be noted that phase relations supplement other relationships depicted through PMEST, citation order, hierarchy and helpful sequence principals. The general phase relation comprehends any relationship not expressed through the other five, while other relations are obvious. Definitive rules for primary and secondary phases and constructing their class numbers ensure the expression of the relationships in mathematically precise and consistent way[6]. Ampersand "&" is the indicator digit for phase relation, while each of eighteen relations has its own indicator digit a/y.

6.3 Main Classes and their Order

Knowledge is librarians' merchandise. Understanding of its nature and ways of growth is vital to a classificationist. Ranganathan's research in social epistemology has been lauded as an everlasting "intellectual contribution to the underlying philosophy of librarian" by late Dean Jesse H Shera (1903-1982)[7]. Ranganathan laid great emphasis on the order of knowledge and consequently on the arrangement of basic subjects in his CC. For him the essence of library classification lay in a helpful sequence of subjects and documents. A classification must depict the structure of knowledge. First division of knowledge in the CC is into traditional disciplines, which he arranges in the order of their evolution as academic studies, namely:

(a) Science and Technology

(b) Humanities

(c) Social Sciences

The social sciences are the most recent academic disciplines to emerge; science and technology, however, were studies (of curiosity) of even primitive humans.

S. No.	Type	Indicator digits	Example	Class number
1.	General phase	a	Relation of Political Science with History	V & a W
2.	Bias phase	b	Psychology for Doctors	S & b L
3.	Comparison phase	c	Physics compared with Chemistry	C & c E
4.	Difference phase	d	Difference between Christianity and Islam	Q, 6 & d7
5.	Tool phase	e	Mathematical Physics	C & e B
6.	Influencing phase	g	Influence of Mahatma Gandhi on Barack Obama	V, 73 "w N61&g z G

Now the disciplines are divided into sub disciplines, namely,

B*Z	Physical Sciences
G*Z	Bio Sciences
K*Z	Animal Sciences
L*Z	Medical Sciences
MZ*Z	Humanities and Social Sciences
S*Z	Behavioral Sciences
T*Z	Social Sciences

Within each discipline the CC has an order of main classes meticulously based on objectively stated principles. An overview of main classes in the CC is follow:

A/B	Science/Mathematics
C/D	Physics/Engineering
E/F	Chemistry/Chemical technology
G/H	Biology/Geology
I/J/ K	Botany/Agriculture/Zoology
L	Medicine
M	Useful Arts
Δ	Spiritual experience & Mysticism
N/O/P	Fine Arts/Literature/Language
Q/R	Religion/Philosophy
S/T	Psychology/Education
U/V	Geography/History
W/X	Political Science/Economics
Y/Z	Sociology/Law

These main classes are in fact preceded by Generalalia and Form classes a/z, and newly emerging classes 1/9, e.g.

a	Bibliography
k	General encyclopedias
m	General periodicals
p	Conference proceedings
w	Biographies
z	Generalia classes
1	Universe of knowledge
2	Library science
3	Book science
4	Mass communication
8	Management science

Sciences (including technologies), in classes A to M, have been arranged in order of 'their increasing concreteness': B, Mathematics, is the most abstract of the sciences, while M, Useful arts (which includes crafts and applied technologies) is the most concrete in the group. Within A/M, theory and practice alternate: 'theory always preceding practice or its applications'. For example, B (Mathematics), precedes C (Physics), which in turn precedes D (Engineering). E (Chemistry) precedes F (Chemical technology). Similarly, I (Botany) is followed by J (Agriculture). This internal arrangement is based on the 'principle of dependency', first promulgated

by Auguste Comte (1798-1857). Unlike Dewey, Ranganathan preferred to collocate the theory with the practice of a subject. Indeed the Library of Congress Classification (1899/1940+) followed this principle earlier to him. In the humanities, which are spread over main classes N to S, the arrangement is in order of 'increasing richness of subject contents'. The order of social sciences, in main classes T to Z, is of 'increasing artificiality of their laws': Z (Law) being legislative and subject to frequent modifications are considered most artificial of the social laws.

One may fault this arrangement. For example, economic and social laws are not artificial, but are based on long observed human nature and thus should not come so far down in the order of classes.

In an article published prior to the release of CC, R.S. Parkhi commended its arrangement of main classes as logical and evolutionary[8]. Elucidating his viewpoint, he described the Generalia class as the complete miniatured view of knowledge that precedes the entire universe of knowledge. B () pervades every science. Physical sciences (C-F) study the matter and forces, which constitute this universe. G (Biology_ is vital science. Classes H-K are in evolutionary order of life on our planet. Classes L-P are application subjects for the well being and prosperity of humankind. Classes from Q (Religion) to T (Education) are for the moral and social development of individuals, which in fact depend upon the correct application of classes L-P, which in turn depend on classes A-K. Classes U-Z study the geographical and social sciences, the latest areas of knowledge to engage the human mind. Here W (Politics, and Government) precedes the creation and distribution of wealth in X (Economics), while Y (Sociology), and Z (Law) keep society intact and going.

6.3.1 Triangular Representation of Main Classes

Ranganathan subsequently added the main class Δ (Greek letter Delta) Spiritual experience
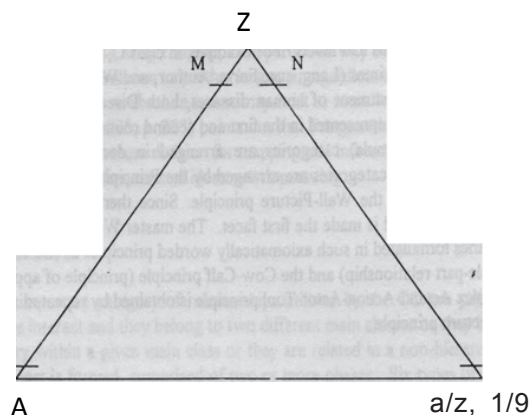

Figure 1. Triangular representation.

and mysticism positioned between the sciences on the one hand and the humanities and social sciences on the other. Δ is at the confluence of two different streams of knowledge, the sciences and the humanities, the two different cultures of C.P. Snow (1905-80). Ranganathan treats spiritual experience as the fountainhead and summation of all knowledge, thus refuting Snow's theory.

The library philosopher and classificationist H.E. Bliss (1870-1955) endeavored to discover a permanent order of main classed based upon, what he called, scientific and educational consensus. In fact no consensus, if any can ever be permanent. Knowledge is social in character. Therefore, their cannot be any order of main classes in Nature. Spatial position of subjects in an order and their social value varies from society to society and from time to time. Renaissance placed premium on humanities, while the industrial revolution era gave prime of place to science and technology. Theology was the queen of academic subjects only to be dethroned in the post – world wars academic research. In classification system of Soviet Union (BBK) Marxism got the first place in any division of knowledge. Ranganathan based his order instead on concrete and objectively stated principles. These principles are helpful in placing ever emerging new main classes at their logical places in the array of main classes. Number of basic subjects has increased to about eight hundred in CC-7 without any problem of placing them at their rightful place in the lengthy array of basic subjects[9].

6.3.2 Division of a Main Class

A main class is further split into [P], [M] and [E] categories whereas categories of [S] and [T], are common to the universe of knowledge. Categories are further divided into facets, and facets into the ultimate isolates. Very traditional main classes are divided into canonical classes, not directly into categories. Obviously canonical classes are traditional or classic divisions of an old main class (Fig. 2). For example, Mathematics has been divided into canonical classes of arithmetic, algebra, geometry, etc, whereas physics into heat, light, sound, electricity, etc. Canonical classes have their on categories. Some of the main classes have systems, specials, environmental constituents preceding the categories.

11

111

12

121

122

123

2

3   1, 2, 3, 4 or 121,122,123 form an Array
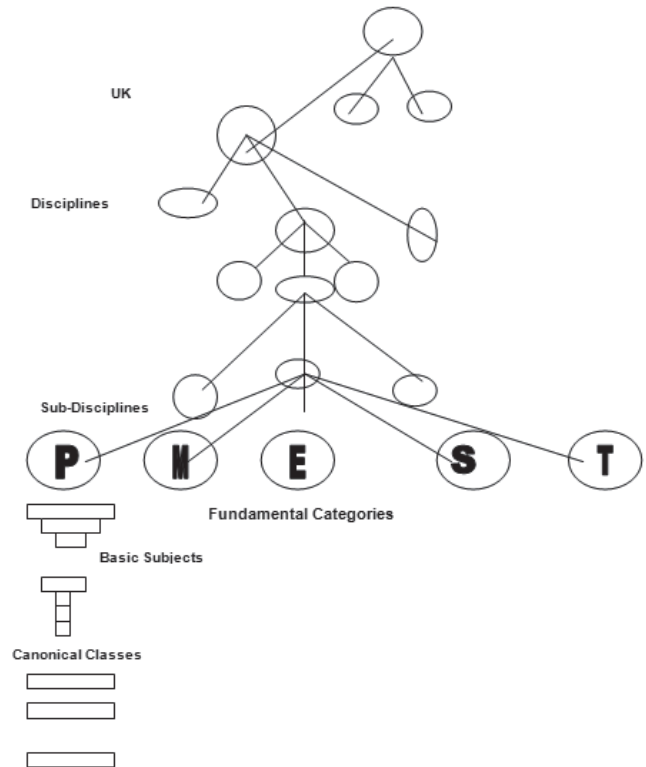
4   11,111 or 12,121 form a Chain

Figure 2. Division of the universe of knowledge (UK).

6.4 Facet Analysis

Facet analysis as developed by Ranganathan is the core of the CC philosophy and methods. No class number for compound or complex subjects is available readymade. It has to be synthesised. Ranganathan has given eight standard and locked-up steps to turn a raw title (as it appears on the document) into a co-extensive class number based on the subject content and form of the document. First of all, specific subject of a document has to the determined for which there are no specific rules. Ranganathan calls it intuitive or trial and error act. It indeed requires flair. Nevertheless, a specific subject is to be determined from the title, subtitle, preface, table of contents, or even by reading the text. The raw title may be augmented by keywords or phrases, if necessary, to fully indicate the subject of the document.

Next to the determination of the specific subject, the subject proper is separated from the common isolates – which represent the tangible elements of the document or viewpoint of the author. Then in

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the process is determined the main class, in which the specific subject falls. Main classes and other basic classes are postulated by the system—these are the givens. Ranganathan postulates that every subject has a basic subject which forms the first facet. Then starts the facet analysis per se into PMEST. Ranganathan has suggested identification of categories in a subject in the order from [T] to [P], moving from facile category to the most elusive one. Broader categories are further resolved into specific facets.

Categories tend to evade definitions. Their nature is somewhat elusive, though not metaphysical. These are still postulated and require much experience and flair to recognise them. For example, the category Personality occurs in all the main classes, yet it is difficult to say what generally it is. Nature of categories varies from main class to main class. Their deceptive nature is clear from the fact that what had been the energy category in editions 4 to 6 has become all of a sudden matter category in the 7th edition. At times it is utterly confusing to categorise an entity clearly. For example, in the class music, musical instruments such as guitar, drum, flute, etc., are designated as matter category. Therefore, if something puzzles us, the only solace seems to acquiesce the way desired by Ranganathan.

In practical classification, one has to start with identifying [T] and come down to [P] via [S], [E] and [M]. Time indicated by apostrophe, is chronological, diurnal or seasonal. For example, 20th century, medieval period, summer season or morning time. Space indicated by a dot is manifestation of geographical and political areas or population clusters. For example, Asia, London, French speaking countries, NATO, G-8, Hilly areas, Iberian peninsula, or Colorado valley. Energy, indicated by a colon, manifests actions, activities, processes and problems. For example, treatment, storage, diseases, teaching, management, grammar, etc., are instances of Energy. Earlier [M] was confined to material of the entity, as wooden chairs, marble sculpture, gold coins. In the latest edition Ranganathan has widened its scope by recognising three variants of this category:

Matter-Property [M-P]

Matter-Method [M-M]

Matter-Material [M-Mt]

For all three of them the indicator digits is ";" semicolon. Of all the fundamental categories Personality [P] is most concrete but paradoxically most difficult to be recognised. Like human personality it is a complex entity and thus elusive something. Ranganathan recommended Residual Method to spot it in a subject. It means that after identifying the bit obvious [T], [S], [E] and [M], categories if any thing still remains in the residue, then it might be personality – as a corollary of "five and only five fundamental categories". Personality incarnates itself in persons (individuals or groups), communities, institutions, animal and plant families, body organs, chemical elements, agricultural produce, languages, religions, art styles systems, ideologies, and the like. It is indicated by a comma.

6.4.1 Facet Formula: Citation Order

(a) Rounds and Levels

A category may manifest itself in more than one concept in a mirco subjects. Recurrence of a category is accounted for by the ingenious postulate of rounds and levels. The PMEST formula is infact comprised of many rounds and levels of facets. For example, in class O (Literature), the category [P] personality occurs four times (Language, Form, Author, and Work), each at a different level. In the subject, Treatment of human diseases, both Diseases and Treatment were manifestations of the first and second round of energy, respectively in the sixth edition. Thus in a facet formula facets of the same category may occur more than once to be accommodated in a logical citation order. Ranganathan postulated that space and time occur in the last round of the facet formula. Categories [P], [M], and [E] can occur in various rounds and at various levels. Levels occur within a round. Within a round [P] and [M] can also occur at many levels. Energy always completes a round and has no level, but only rounds.

To mechanise the arrangement of categories and their scattered facets, Ranganathan after a long trial, finally settled on a general and all encompassing and very handy facet formula, popularly known as PMEST (Personality/Matter/Energy/Space/Time). Rounds of categories and within a round levels are arranged by the 'Principle of dependency', which Ranganathan formulated as the Wall-Picture principle: Since there cannot be any mural without a wall, so the wall is made the first facet. The master 'Wall-Picture principle' has various corollaries formulated in such axiomatically worded principles as the 'Whole-Organ principle' (whole-part relationship) and the Cow-Calf principle (principle of appurtenance) to arrange round and levels of facets; the more complex 'Actand-Action-Actor-Tool principle' is obtained by of mix of the above principles.

In the sequence, the basic facet-usually represented by main class-- or its amplification by system (Sm), environment (Env), or specialisation (Sp), precedes other facets. The grand general facet formula may be represented as follows (numbers preceding a category indicate its round, while subscripted numbers following a category indicate its level):

(BF), [1P1], [1P2], [1P3], [1P4]; [1M1]; [1M2]; [1M3]: [E], [2P1], [2P2]; [2M1]; [2E], [3P1]…:[3E]. [S1]. [S2]'[T1]'[T2]

In the-current edition of the CC, the total number of facets and their general sequence is as follows[10]:

Field of study → System → Environment → Specials → Object of study → Kinds/Parts of Objects → Properties of object → Action on the object → Kind of action → Method of action → Agent of action → Instrument of action → Space → Space qualifier → Time → Time qualifier.

(b) Absolute Syntax: Quest for a Holy Grail

In his spirited quest for discovering a natural order of facets, Ranganathan proposed the idea of an 'absolute syntax of facets', by which he meant a sequence in which component facets of a subject 'arrange themselves in the minds of the majority of persons'[11]. Indeed, he conjectured that absolute syntax may be the 'same for a large majority of persons irrespective of their mother tongues', so that absolute syntax and linguistic syntax do not necessarily coincide. He further believed that absolute syntax was close to his own PMEST citation order, arrived at by rigorous postulates and principles. The basic question is whether there exists such an absolute syntax of ideas in the minds of the majority of adults, free from the incessant impact of the mother tongue and its grammar as impressed on human minds since infancy. There is no empirical evidence that it exists at all. Nevertheless, as Iyer asserts, "If a particular way of structuring a subject can be easily understood in translation to another language, regardless of the linguistic variations of individual tongues, then an absolute syntax may exist at some level"[12]. Arthur Maltby points out that Ranganathan believed in knowledge synthesis rather than in its mere division for mapping and information retrieval; this makes the search for the absolute syntax of ideas worth pursuing.[13]

(c) Synthesis

Analysis is followed by synthesis of facets. In a document first of all subject per se is to be separated from common isolates denoted by roman malls and added after the subject facets with their own indicator digit. These are the two types: anteriorising and posteriorising.

Anteriorising common isolates, e.g.,

a	bibliography
k	encyclopedia
m	periodical
r	administration report
s	statistics
t	commission report
x	collected works

These are added with the connecting symbol double inverted comma "", and bring the documents to its anterior position.

Posteriorising common isolates are further of three types: Personality, Matter-Property, and Energy.

b14	calculation
aTc	critical study
t	educational/research institutions or learned societies.

These are added with their respective indicator digit comma, semi colon and colon, respectively and take the document to a backward position:

2;5 'P"a	Bibliography of 21st Century Classification
2"k73,N9	Francis and Taylor Encyclopedia of Library & Information Science
2.73,g,M7	American Library Association
2,J1*Z. 73:a T	Assessment of US Academic Libraries
E*Z: aR	Research in Chemical Sciences
Y;aa	Theory of Sociology

Class numbers look lengthy like algebraic equations, even unwieldy and surrealistic such as:

O,111, 2J64, M+V" aN	20th Century Bibliography of Merchant of Venice by Shakespeare
L-L-9Un4-9F, 32; 4:6	Homeopathy for Heart Diseases of Old People Living in High Altitudes
T,18.1=CN48,g, 9N" v	A History of the Association of Commonwealth Universities
V, 73; 1844X=M1	US Armament Policy towards Pakistan
V,44; 181=(Q,7)	India's Foreign Policy toward Muslim Countries
Y" a" m73, N	Sociological abstracts

Ranganathan sacrificed the brevity and simplicity of notation to make the notation extremely hospitable, and to produce finely co-extensive class numbers. Most of the classifiers are afraid of its notation, which makes the system unpopular.

7. SHELF ARRANGEMENT

7.1 Principle of Inversion

The CC follows the Principle of Inversion first used by the Universal Decimal Classification (UDC). It means that the citation order of facets in the facet formula is reverse of their arrangement on the shelves. To elaborate, [T] is the last facet in the PMEST citation, but the subjects fitted with only [T] will file before [S] category which in turn will file before [E], and so on. In the PMEST citation order categories are arranged in order of 'decreasing concreteness': [P] Personality is the most concrete and [T] Time the most abstract; [E] Energy lies midway being as concrete as it is abstract. On the shelves or in a classified bibliographic database, however, the order of subjects is from general to specific, that is, from abstract to concrete, i.e., from [T] to [P]. Overall order within a class comes out to be:

General treated generally

General treated specially

Special treated generally

Special treated specially

This order is achieved by ingeniously fixing the ordinal value of semantic and indicator digits, e.g., ordinal value of the indicator digit for [T] is less than that of [S], and so on. The other digits are arranged in the order a/g, 0/9, A/Z.

7.2 APUPA Pattern

Within a given specific class he arranged documents on the shelves in what he termed as the APUPA pattern. The letters of the acronym stand for different pockets of documents in a given and related class: A on both the sides represents Alien (or related) subject zones; P is a Penumbral region. First Penumbral area comprises of approach documents such as bibliographies, dictionaries to comprehend the U (region). U is the Umbral region, having core documents on the subjects. The second P region enshrines advance document such as, advances in the subject, critical studies, organisations or centre for the advancement of the discipline. Obviously, such documents are studied after comprehending the core documents in the U region. The general APUPA pattern is achieved by postulating two kinds of (common isolates): Anteriorising Common Isolates (ACIs) and Posteriorising Common Isolates (PCIs).

Common isolates are like the standard subdivisions of DDC or form and view point common auxiliaries of the UDC which and are attachable to any class, irrespective of its specificity. ACIs are not the subject proper, but form approaches to a subject. They include, for example, bibliographies, synopsis, histories, and glossaries of a subject. Documents fitted with ACIs are filed anterior to the subject proper. This forms a penumbral region, having less of the subject proper. Then follows the proper pure subject with all its subdivisions. For example, basic and compound subjects could constitute the umbral region in the pattern. This is followed by another penumbral region, formed by fitting documents of the umbral region with PCIs. These are documents about the subject that are best read by advanced students or researchers after the mastery of the core subject. These include educational and research institutes on the subject, critical reviews, and recent advances in the subject. Thus the umbral region is surrounded on both sides by penumbral regions of differing natures, which in turn are flanked by two different alien regions.

The APUPA pattern, (Fig. 3) unique to the CC, is one of the logical, pedagogically useful and beautiful arrangements of documents on the shelves. It uniformly and constantly weaves a perceptible useful pattern of documents on the shelves or of their surrogates in a bibliography. The arrangement is so impeccable that it is appropriate to say that to browse a CC classified library is itself an education. This has been achieved by investigating deeply the structure of knowledge and arranging its components in a way most useful to the most users is a continuum from A/Z.

Figure 3. APUPA on the shelves.

7.3 Index

The 6th edition had many subject indexes, but the 7th has none attached to it. Later in 2002 CINDEX a machine readable index to the CC-7 on a CD in UNESCO'S WINISIS was issued. It is waiting to be incorporated into the print edition (1987).

8. REVISION, USE AND STATUS

Despite being projected as India's national scheme of classification, it is not a widely used system in India. The DDC outranks any other system in popularity. Though no register of its users has

been maintained, but according to a very favorable estimate some 24 % of the libraries were using this system in India in 1960s. The editions used vary from the 2nd (1939, University of Pune) to 4th (1950, University of Delhi). They have never employed Ranganthan's Method of Osmosis to implement the revise version of a scheme. Inertia prevails above any excuse. The 7th (1987) is used only by the DRTC. No new library is adopting it. CC class numbers are also given as a bibliographic element in the entries of the Indian National Bibliography[14]. There is no national committee or a substantive institutional backing to advise or to take responsibility of its revision or publication[15]. It is now repeatedly reprinted by a commercial publisher for students.

9. FUTURE

The system is based on postulates and principles integrated into a coherent and fully and finely developed theory of classification. Fran Miksa aptly says that, "Ranganathan treated library classification as a single unified structure of ideas which followed from a cohesive set of basic principles"[16]. For this Ranganathan evolved apt principles and forged precise tools. The theory of the CC is in fact considered as the theory of classification in general which is taught in many library schools the world over. The contribution of the CC lies in its facet analysis technique, the concept of fundamental categories and hordes of practical postulates and hospitality devices. It provides scientific guidelines for construction of any new classification system. Many depth and special classification systems have been designed using the CC methods[17]. It can be used to design other indexing vocabularies such as thesauri or depth classification for micro subjects. Its facet analysis is immensely helpful in query formulation for better recall and precision of output[18]. Some of the search engines or web directories invariably use Ranganathan's approach with good result in retrieving on the web. One wonders if Ranganathan anticipated the WWW and search engines[19]. Advances in classification theory and practice in the online environment very much depend on facet analysis[20-21].

Many plans to revise it came out still born due to lack of proper planning and resources needed for this gigantic task. Officially, a recent Kannada version has been published in collaboration with the Central Institute of Indian Languages, Mysore[22]. It is based on latest developments in the CC. But survival of the system in its present body seems uncertain due to long neglect. Already subtly pervaded in the making of new systems and revision and the old once, and getting sublimated into a theory, it has achieved nirvana from bodily form—transcending the cycle of life and death. It subliminally pervades the universe of knowledge organisation.

REFERENCES

1. Satija, M.P. Classification and Ranganathan: A chronology 1924-1992. *International Classification,* 1992, **19**(1), 3-6.
2. Satija, M.P. A critical introduction to the 7th edition (1987) of the Colon Classification. *Cata. Classif. Quarter.*, 1990, **12**(2), 135-38.
3. Gopinath, M.A. The Colon Classification. *In* Classification in the 1970's, edited by Arthur Maltby. Clive Bingley, London, 1972, pp. 53-85.
4. Ranganathan, S.R. Prolegomena to library classification. Ed. 3. Asia Publishing House, Mumbai, 1967, pp. 143-323.
5. Ranganatiha, S.R. Colon Classification, Ed. 7, edited by M.A. Gopinath. Sarada Ranganathan Endowment, Bangalore, 1987, 33p.
6. Satija, M. P. Extension of two phased subjects in Colon Classification. *Herald of Lib. Sci.*, 1979, **18**(4), 344-48.
7. Shera, J.H. Sociological foundation of librarianship. Asia, Bombay, 1970, 106 p.
8. Parkhi, R.S. Colon scheme of library classification. *Modern Librarian*, 1933, **3**(2), 87.
9. Ranganathan, S.R. Colon Classificaiton, Ed. 7. edited by M.A. Gopinath, Sarada Ranganathan Endowment, Bangalore, 1987, pp. 57-66.
10. Ranganathan, S.R. Colon Classification, Ed. 7. edited by M.A. Gopinath, Sarada Ranganathan Endowment, Bangalore, 1987, pp. 49-51.
11. Ranganathan, S.R. Prolegomena to library classification, Ed. 3. Asia Publishing House, Mumbai, 1967, pp. 143-323.
12. Iyer, H. Classification Structures. Indeks Verlags, Frankfurt a/M, 1995, 184p.
13. Maltby, Arthur. Sayers manual of classification for libraries, Ed. 5. Andre Deutch, London, 1975.
14. Satija, M.P. Use of Colon Classification. *International Classification*, 1986, **13**(2), 88-92.
15. Satija, M.P. Future and revision of colon classification. *Knowledge Organization*, 1997, **24**(1), 18-25.
16. Miksa, Francis L. The DDC, the universe of knowledge and the post-modern library, Forest Press, Albany, NY, 1998, 67p.
17. Vickery, B.C. Faceted classification: A guide to the construction and use of special schemes. Aslib, London, 1960.
18. Satija, M.P. Ranaganathan and the classification of electronic documents. *DLIBCOM: Digital Library Communication*, 2007, **2**(8-9), 4-7.

19. Glassel, Aimee. Was Ranganathan a Yahoo. http:// scout.wisc.edu/project/ (accessed on 20 March 2008).

20. Slavic, Aida. Faceted classifications: Management and use. *Axiomathes*, 2008, **18**(2), 1-15. http://www.springerlink.com/content/n7hk67u52078/ (accessed on 20 October 2008).

21. Suman, Aparajita. From knowledge abstraction to management: Using Rangantghan's faceted schema to develop conceptual frameworks for digital libraries. Chandos, Oxford, 2013, 200p.

22. Vargikaran, Dwibndu. Kannada translation of S.R. Ranganathan's Colon Classification. Ed. 7. edited by M.A. Gopinath. CIIL, Mysore, 2012.