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Basis for Study of Compatibility, and of Compatibility of the Colon Classification with the Universal Decimal Classification. (Classification problems. 37).

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[Five types of compatibility studies are possible between document-finding systems. A Basis of Reference for compatibility studies is given, in terms of the dominant purpose and of the factors in the mental set of the majority of the readers seeking the service of the system. A document-finding system should have an efficient scheme for classification built into it. The latter should be based on a sound and dynamic theory of classification. The essential features of the current general theory of classification are indicated. The extent to which CC and UDC conform to it is examined. Illustrates, with examples, the compatibility of CC-in-Theory with UDC-in-Theory and of CC-in-Action with UDC-in-Action. Even though UDC-in-Theory may not be fully compatible with CC-in-Theory, UDC-in-Action can be made compatible with CC-in-Action and with the Basis of Reference, with the aid of the guiding principles given in the *Guide to UDC* (1963). These principles are in conformity with the general theory of classification. The advantages of basing an electronic document-finding system on an efficient scheme for classification and the compatibility of CC and UDC for the purpose are mentioned. The additional advantage of using CC is indicated].

1 Axiom of Compatibility

11 FIELD OF STUDY OF COMPATIBILITY

Compatibility is usually studied between different document-finding systems — particularly, between their respective essential elements. Two usual fields for the study of compatibility are :

- 1 Machine systems, hereafter mentioned as Electronic System; and
 - 2 Conventional systems, particularly Classified Catalogue, hereafter mentioned as Catalogue System.
- Compatibility study may be made between
- 1 Any two electronic systems;
 - 2 Any two catalogue systems;
 - 3 Any catalogue system and any electronic system;
 - 4 The classificatory language used in any catalogue system and the machine language of any electronic system; and as the ultimate basis of all these;
 - 5 Any two schemes for classification.

12 COMPATIBILITY WITH A DEEPER FACTOR

Whatever be the systems taken up for study of compatibility, the study should be based on the compatibility of each of them with something common but deeper — namely,

- 1 The purpose for which any document-finding system is used; and
- 2 The mental set of the reader while seeking its aid.

13 PURPOSE OF THE USE OF DOCUMENT-FINDING SYSTEM

We shall assume that the purpose of the majority of readers is to find the main entries for the precise subject of interest at the moment.

14 FACTORS AFFECTING THE MENTAL SET OF READER

Experience gained in doing reference service to readers — that is, in helping a reader to find all the documents meeting his exact needs at the moment — leads to the recognition of the under-mentioned factors as affecting his mental set while searching for his documents:—

- 1 The Universe of Subjects is evergrowing. It throws forth new subjects continuously. It is multidimensional;
- 2 The normal human mind finds comfort in tracing the subjects if they are arranged in a linear sequence — it is not only a comfort but also a necessity;
- 3 Most of the subjects are compound ones made of a sequence of constituent kernel ideas — now denoted by the term 'Facets';
- 4 The particular fundamental pattern of sequence among the facets of any compound subject that is helpful to the majority of readers. This pattern of sequence is denoted by the term 'Facet Syntax'. It is conjectured that the Facet Syntax would agree with Absolute Syntax among the constituent ideas making up a compound subject. By Absolute Syntax is meant the syntax of ideas uninfluenced by linguistic syntax, which varies from language

to language. The conjecture about the possible identity of Facet Syntax and Absolute Syntax needs verification by team research by a body consisting of epistemologist, linguist, reference librarian, classificationist, and statistician. The investigation should be planned and regulated by the statistician in consultation with the others. The necessary results should be derived from the observed data with the aid of statistical calculus (8);

5 Document-finding is facilitated, if the main entries of the documents on a stated small subject-range are presented to the reader in a sequence helpful to majority of readers and have Feature Headings of each subject in the range arranged according to Facet Syntax. This is analogous to the necessity for clothes of different colours being placed before us arranged in a more or less helpful sequence of the colours to enable us to state and choose precisely the specific colour wanted by us; and

6 While aiding a reader in formulating his subject-requirement, it is helpful to facet analyse his questions by the same method as the one used in facet analysing the subject of a document.

15 BASIS OF REFERENCE IN COMPARING COMPATIBILITY

The factors enumerated in Sec 14 establish the necessary feature of a document-finding system. This we shall denote by the term 'Basis of Reference'. Let us represent it by "X". If a document-finding system "A" is compatible with "X", and if another document-finding system "B" is also compatible with "X", then the systems "A" and "B" are compatible with each other. This may be denoted by the term 'Axiom of Compatibility'. It is conjectured that the compatibility of any document-finding system with "X", the Basis of Reference will depend upon the scheme for classification built into the document-finding system. Of course, this implies that a document-finding system should have a scheme for classification built into it. This is certainly necessary to satisfy category 5 given in Sec 14.

16 NEED FOR A DYNAMIC THEORY OF CLASSIFICATION

If a scheme for classification forms an essential element to be built into a document-finding system, the helpfulness of the document-finding system will depend upon the efficiency of the scheme for classification in keeping step with the incessant growth of the Universe of Subjects and also with the variation, from time to time, of the subject approach of readers. To secure this efficiency, the scheme for classification should be based on a dynamic theory of classification. If this be true or not, in general the study of the compatibility of two schemes for classification should be certainly based on the respective theories forming the foundation of the schemes.

17 CLASSIFICATION SCHEME SHOULD KEEP STEP WITH THEORY

As an aside, it may be stated that any scheme for classification should have built-in capacity to keep step with the successive refinements in the theory of classification necessitated by the changes in the universe of subjects from time to time and by the change in the approach of readers to subjects. Then only the scheme will give satisfactory service in document-finding. It will therefore be helpful to begin with a consideration of the theory of classification.

21 Dynamic General Theory of Classification

21 EARLY DESCRIPTIVE THEORY

The first attempt at a general theory of classification was made early in the twentieth century by E C Richardson (10), W C Berwick Sayers (11), and Henry Evelyn Bliss (4). But it was all largely descriptive and hardly dynamic. The difference in the foundations of UDC and DC was not appreciable. Thus at that time, there were no schemes for classification with distinctly different kinds of foundation. Therefore, the probability for provoking a dynamic theory was low.

22 CURRENT DYNAMIC THEORY

The publication of CC (1933), which was based on a totally different kind of foundation, provided material for a truly comparative study of classification. Such a study was favourable to the development of a dynamic general theory of classification, which was not merely descriptive. Another favourable factor was the earlier publication of the *Five laws of library science* (1931). It gave a unified view of everything connected with library service. These laws were of help in driving the foundation piles of the theory of classification to a great depth, so as to base them on a firm rock as it were. The resulting theory was embodied in the *Prolegomena to library classification* (1937). This theory was not only general, but it had also some elements of dynamism. In the light of the ever-changing Universe of Subjects and of the demands of readers, this has been continuously refined. Its dynamism has been steadily increasing. Edition 3 published in 1967 consolidated results obtained till 1966. Further improvements are being reported in the quarterly *Library science with a slant to documentation* (1964-) and in the *Annual seminar (DRTC), Papers and proceedings* (1963-). This seems to be the only current dynamic general theory of classification. The latest version of this theory has highlighted the great value of a freely faceted scheme for classification as an aid in document-finding.

23 **NORMATIVE PRINCIPLES IN THE CURRENT DYNAMIC THEORY**

The normative principles formulated in the *Prolegomena* are 91 in number. The following table displays the nine groups into which they fall:—

SN	Name of the Set of Normative Principles	Number of Principles	Reference to <i>Prolegomena</i> , Ed 3
1	General Laws	6	Chap DC to DH
2	Laws of Library Science	5	Sec DB1 to DB5
3	Canons of Classification for work in the Idea Plane	15	Part E
4	Canons of Classification for work in the Verbal Plane	4	Part G
5	Canons of Classification for work in the Notational Plane	21	Parts J to L
6	Canons for Book Classification	3	Sec UB2, VB2 and VC3
7	Postulates of Classification	17	Part R
8	Principles for Facet Sequence	4	Sec RM1, RN1 to RN3
9	Principles for Helpful Sequence	16	Part P
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91			

3 **Compatibility of CC and UDC, Based on Theory of Classification**31 **COLON CLASSIFICATION**

Edition 1 of CC (1933) was not based upon any objective theory of classification. However, some unexpressed theory has been guiding it from the sub-conscious level. But from Edition 2 (1939) onwards, the development of CC is based on the dynamic general theory in the *Prolegomena*, objectively and in all strictness. It keeps pace with every refinement in the theory made from time to time.

32 **UNIVERSAL DECIMAL CLASSIFICATION**

During the last fifteen years, some guiding principles have been formulated to regulate the development of UDC. But these principles are not deep and dynamic. Nor are all of them of a general nature. However, there is evidence that some unexpressed deeper general theory has been guiding from the sub-

-conscious level not only UDC but also DC. It is mostly subjective. It has not been brought to the objective level and tidied up. Therefore, it does not have sufficient dynamism. However, some of the elements in that subconscious theory apparently agree with the objective theory in the *Prolegomena* while others do not. This is shown in a tabular form in Sec 33 and 34, comparing the conformity of CC and UDC to the general theory in the *Prolegomena*, Ed 3.

33 CONFORMITY OF CC AND UDC IN THE IDEA PLANE

SN	Points of Comparison	CC	UDC
1	Separation of planes of work into Idea, Verbal, and Notational Planes, making the first paramount and making the last implement the findings of the first.	Takes maximum advantage of this guidance of the theory.	There is occasional evidence of some distinction being made at subconscious level. But the paramountcy of the Idea Plane and the obligation of the Notational Plane are not always carried out. The Notational Plane often inhibits the work in the Idea Plane.
2	Fundamental pattern in the structure of the compound subjects going with different basic subjects.	Uniformly follows the postulates of the five Fundamental Categories and provides for Rounds and Levels of facets as provided in the general theory.	Recognises only space and time facets. The other facets and phase relation are not separated due to the inhibition of the work in the Idea Plane by the shortcomings of the Notational Plane and due also to its DC core having many compound subjects.
3	Fundamental pattern in the sequence of the facets of the compound subjects going with different subjects.	Uniformly follows the postulates and the principles provided in the general theory.	Secures only partially and even that without guidance by theory.
4	Uniqueness of class number for a subject.	This is secured by strict adherence to the general theory.	There is deliberate provision for alternative class numbers for a subject.

34 CONFORMITY OF CC AND UDC IN THE NOTATIONAL PLANE

SN	Points of comparison	CC	UDC
1	Length of base	60 for use in the array of main subjects, made up of 23 Roman smalls (excluding i, l, and o), 10 Indo-Arabic numerals, 26 Roman capitals and the Greek letter Δ . In the other arrays, 58 only, because l and O are omitted.	10 made up of the Indo-Arabic numerals only.
2	Extrapolation	Secured by Sector Notation.	Secured by Octave Notation, after the acceptance of the recommendation made by FID/CA in 1955.
3	Interpolation in Array	Secured, to any extent wanted, by the use of Empty Digits (Sector Notation) Emptying Digits, and Empty-Emptying Digits. Sector Notation alone gives the capacity of 1,166 in an array in which no array isolate number has more than three digits. The capacity can be increased indefinitely by the use of Emptying and of Empty-Emptying Digits.	No provision.
4	Extrapolation in Chain	Secured by using decimal fraction notation.	Secured by using decimal fraction notation.
5	Hospitality among facets	Secured to any extent wanted by following the postulates of Rounds and Levels provided by the theory and by the use of a distinctive	Possible only by repeated use of Colon Device.

SN	Points of comparison	CC	UDC
		Indicator Digit for each Fundamental Category.	
6	Mnemonics	Satisfies the Canon of Scheduled, Systematic, and Seminal Mnemonics.	Satisfies the Canon of Scheduled Mnemonics to a limited extent.
7	Expressiveness of Class Number	Secured by the use of different Indicator Digits to indicate the nature of the succeeding facet.	Secured in respect of Space and Time facets only by the use of distinctive Indicator Digits, but not in the other cases.

35 UDC ALLOWS REDUCTION IN THE APPARENT INCOMPATIBILITY

Viewed from the angle of UDC-in-Theory, the Tables in Sec 33 and 34 would apparently indicate much of incompatibility between CC and UDC. But it has been found both in teaching and in comparative study, that UDC numbers can, in most cases, be constructed in accordance with the current General Theory of Classification. Thus, UDC-in-Action admits of its being so used as to reduce its incompatibility with CC-in-Action almost to a vanishing point. This can be seen by examining the two schemes-in-action as shown in Sec 4 and its subdivisions.

4 CC and UDC in Action

The subjects in examples in Sec 41, 42, and 43 are classified according to the Method of Postulates (9). Of the steps 0 to 8 of the method, steps 3, 5, and 8 are not given for the examples as they are not necessary in the comparative study. The prescriptions in the *Guide to the Universal Decimal Classification* (1963) have also been used in constructing the UDC numbers.

1 4 COMPATIBILITY IN THEORY AND IN ACTION

Step 0.	Raw Title	Audio-visual aids in teaching.
Step 1.	Expressive Title	In education, Audio-visual aids in teaching.
Step 2.	Title in Kernel Ideas	Education. Audio-visual aid. Teaching technique.
Step 4.	Transformed Title	Education (BS). Teaching technique [1M1]; Audio-visual [1M2].

Step 6.	Title in Kernel Numbers	
	CC	T(BS);3[1M1];01[1M2]
	UDC	37(BS) 13[1M1]33[1M2]
Step 7.	Synthesised Class Number	
	CC	T;3;01
	UDC	371·333

In this case, UDC is compatible with CC both in theory and in action. For, they conform to the same theory, recognise the same Kernel Ideas and the same sequence for them, in the subject

42 COMPATIBILITY IN ACTION THOUGH NOT IN THEORY

Step 0.	Raw Title	Hereditary diseases of the eye.
Step 1.	Expressive Title	In medicine, hereditary diseases of the eye.
Step 2.	Title in Kernel Ideas	Medicine. Hereditary disease. Eye.
Step 4.	Transformed Title	Medicine (BS). Eye [1P1]. Hereditary disease [1M1].
Step 6.	Title in Kernel Number	
	CC	L(BS),185[1P1];4G[1M1].
	UDC	61(BS):611·84[1P1]:616-056·7 [1M1]
Step 7.	Synthesised Class Number	
	CC	L,185;4G
	UDC	61:611·84:616-056·7

In this case also CC number and UDC number are equivalent and coextensive with the subject of the document. Therefore, they are compatible with each other. But to come into conformity with the theory, UDC had to use Compound Subjects as Kernel Ideas. Secondly, though in theory UDC had freedom to arrange the "Subject numbers" connected by Colon in any sequence, the sequence preferred above conforms to the theory. Thus, although the two schemes-in-theory need not necessarily be compatible, compatibility has been secured between the two schemes-in-action.

43 COMPATIBILITY NEITHER IN ACTION NOR IN THEORY

Step 0.	Raw Title	Genetics for ophthalmologist
Step 1.	Expressive Title	In Biology, genetics expounded with a bias to medicine of the eye.

Step 2.	Title in Kernel Ideas	Biology. Genetics. <i>Bias to Medicine. Eye.</i>
Step 4.	Transformed Title	Biology (BS). Genetics [1M1]. (Phase relation) <i>Bias Medicine</i> (BS). Eye [1P1].
Step 6.	Title in Kernel Numbers CC UDC	G(BS);6[1M1]&bL(BS),185[1P1]. 57(BS) 5[1M1]:617(BS)7[1P1].
Step 7.	Synthesised Class Number CC UDC	G:6&bL,185 575:617.7

In this case, UDC-in-action is compatible neither with CC-in-action nor with the Basis of Reference X. For, the UDC number for the subject of the Biasing Phase represents the narrow one of "surgical diseases of the eye" instead of the more extensive subject — namely, eye in all its properties from anatomy onwards — as mentioned in the subject.

However, to correct this incompatibility, as it were, according to the principles given by Mills, in the *Guide to the Universal Decimal Classification* (1963), yields the following UDC number for the subject.

57:575:61:611.84

This leads in substance to the Basis of Reference X emerging from the Theory of Classification. But for Mills having expounded the theory of classification as a basis, this correction of the incompatibility of the traditional UDC number for the subject would not have been possible. Incidentally, it proves that a suitable policy for UDC-in-action can make it compatible with the current General Theory of Classification given in the *Prolegomena* and with CC or any other scheme for classification conforming to that theory.

5 Compatibility Between Classification and Electronic System For Document-Finding

51 CLASSIFICATION AND ELECTRONIC SYSTEM

The psychology of the reader with respect to his document requirements and his approach to document-finding is the same whether he uses a catalogue or an electronic document-finding system. Therefore, an important objective of experiments in the use of an electronic document-finding system has been to find out how far it can stimulate the conventional document-finding system in satisfying the psychology of the reader. It is necessary for the librarian to ask the electronic engineer to design the machine to satisfy his specifications in respect of its suitability

to meet the needs of the reader. Experience with document-finding system using general purpose computers during the last decade particularly in USA, USSR, and more recently in UK, supports this demand of the library profession. Further, it is being realised in an increasing measure that:—

1 The use of electronic system does not obviate the use of classification in it;

2 The potentiality of use of an electronic system could be better exploited, if

21 The subject of a document is put into the memory of the system in a correctly faceted form coextensive with the subject;

22 The subject of the question put by reader is also similarly facet-analysed;

23 The components found by facet analysis are arranged in a fundamental pattern of helpful sequence (7);

24 The entries for the documents selected by the machine as relevant to the reader's question are displayed in a classified sequence with necessary Feature Headings to help browsing; so that a more precise statement of the subject sought and selection of the correct entries by the reader are facilitated (5).

52 SPECIAL PURPOSE MACHINE: DOC-FINDER

Experience is also being gained about the different kinds of electronic systems and about the conditions of their viability. Ideas about the kind of programs most appropriate for use in electronic systems are also just developing. A special purpose electronic machine — say, a "Doc-Finder" — may not have any arithmetical work to do as the computer. Its work will be only to establish one-one correspondence between the question put to it and the entries in its memory.

53 COMPATIBILITY OF CC

Five years ago, computers used in document-finding were not as sophisticated as they are today. It was thought that the CC, with its notational system having 60 Substantial Digits and 11 Indicator Digits, was too complicated for computers. But the computers of today can handle even a much larger number of digits — as many as 120 and even more. In fact, experiments at the DRTC (Bangalore) during the last two years has shown that not only is CC compatible with electronic system, but the scheme offers certain special advantages.

54 COMPATIBILITY OF UDC

There are already several electronic systems using UDC. Experiments are being done at several centres to improve the

efficiency of the use of the scheme in such systems (1). Thus, UDC is compatible with electronic system.

6 Increasing the Compatibility of UDC

The FID has been fostering the development and use of UDC with great persistence. The UDC Committee of the FID have become aware of the developments in the theory of classification in India and of the advantage of implementing its findings in UDC. For example, it has accepted the Octave Notation suggested by India; and there have also been some cases of adoption of facet notation. According to an estimate of Donker Duyvis (2), UDC has been able to break away from its parent DC in nearly two-thirds of the subdivisions from the fourth order subdivisions onwards. But, for one reason or another, the promoters of UDC appear to be still reluctant to break away from its parent DC much more than what Donker Duyvis has stated. Nor has it yet made up its mind to base the development of UDC on a dynamic general theory of classification — whether an existing one or one that they might themselves build up. Unless this is done, an integrated development of the scheme along right lines is likely to be marred considerably. There can only be piecemeal adjustments from time to time, taking UDC nearer and nearer to hotch-potch. As a result, the scheme will be less and less able to accommodate the incessant new proliferations in the Universe of Subjects, consistently in a helpful place among the already existing subjects. Eventually, though UDC may continue to be compatible with an electronic system, it will disable that system in finding documents efficiently without leakage and without noise. However, the contents of the *Guide to the Universal Decimal Classification* (1963), adopted as publication 345 of FID, conform very much to the theory of classification. See also Perreault (6). This is a good augury for the future of classification.

7 Advantage of Using CC in an Electronic System

In the discussion in Sec 33 and 34, the possibility for internal inconsistencies in UDC appeared. The main reason for this is that UDC and its developments are not based on an explicitly stated dynamic theory of classification. On the other hand, CC is based on such a theory and can avoid internal inconsistencies. CC has the capacity for

- 1 Receiving any new subject in the correct helpful place among the already existing subjects, as determined by the Idea Plane;
- 2 Keeping pace with the refinements in the General Theory of Classification;
- 3 Self-perpetuation;

4 Providing a unique coextensive class number to a subject, however deep, so as to place it in the correct helpful place among the already existing subjects. D J Foskett has drawn attention to the particular advantage offered by the CC methodology in electronic document-finding systems (3); and

5 Meeting new demands of readers.

Thus, in the balance, whether it be in a conventional document-finding system or in an electronic one, CC has advantages over UDC.

8 Bibliographical References

- 1 Sec 54 BHATTACHARYYA (G). Vital role of depth classification in a system for document-finding: A trend report. (Lib sc. 6; 1969; Paper C).
- 2 Sec 6 DONKER DUYVIS (F). Policy of revision of the Universal Decimal Classification. (1). (Rev doc. 23; 1956; 140).
- 3 Sec 7 FOSKETT (D J). Some fundamental aspects of classification as a tool in informatics. (*In* Mikhailov (A I) and others. On theoretical problems of informatics. 1969. P 70).
- 4 Sec 21 BLISS (H E). Organization of knowledge in libraries. 1935.
- 5 Sec 51 NEELAMEGHAN (A). Integrated approach of India to the design and development of document retrieval systems. (International Forum on Informatics (Moscow) (1969). Volume of papers. 1969. V 2; P 114-47).
- 6 Sec 6 PERREAULT (J M). Towards a theory for UDC. 1969.
- 7 Sec 51 RANGANATHAN (S R). Classification and Doc-Finder. (Annual seminar (DRTC). 6; 1968: Paper BM).
- 8 Sec 14 ——. Hidden roots of classification. (*Infstor retr.* 3; 1967; P 407-10, Sec 7).
- 9 Sec 4 ——. Prolegomena to library classification. Ed 3. 1967. Chap SB.
- 10 Sec 21 RICHARDSON (E C). Classification, theoretical and practical etc. 1901.
- 11 Sec 21 Sayers (W C B). Canons of classification. 1915.