DEPTH CLASSIFICATION

21 PHASE AND INTRA-FACET RELATIONS

S. R. RANGANATHAN

Traces the evolution of the concept of phase relation. Distinguishes it from facet relation. Describes the five kinds of phase relation isolated till now. Shows the notational implementation of them in CC. Suggests a method for their implementation in UDC. Distinguishes intra-facet relation from laminated isolate. Describes the notational implementation of the former proposed in the forthcoming edition 5 of Colon classification.

1 TERMINOLOGY

For brevity in exposition and for the facility of the reader, a brief terminology is first given with some explanation and a few examples:

Main Class is any class listed in the schedule of main classes of a scheme of classification.

Canonical Class is any conventional subdivision of a main class, not based on a train of characteristics, but listed as such in a scheme of classification.

Basic Class is a main class or a canonical class.

Examples: Mathematics, Physics, Biology are basic classes in CC and UDC. In the former they are main classes; in the latter they are canonical classes. Literature, Linguistics, History are main classes in both.

Train of Characteristics is a sequence of characteristics used successively in dividing a basic class, such that the wholes of the original universe are preserved as wholes in the subdivisions and their organs are not reached, and such that the subdivisions continue to be manifestations of one and the same fundamental category, be it personality, matter, energy, space, or time. For example, in Agriculture, the primary utility, the part put to the primary use, the species, the variety, the strain etc form a Train of Characteristics giving divisions which are manifestations of personality. The problem studied initiates another train of characteristics giving divisions which are manifestations of energy.

Facet of a Basic Class is the totality of the divisions of its divisions based on a single train of characteristics. For example, the schedule of plants given in the chapter on Agriculture is a facet of that basic class; so also, the schedule of problems given in the same chapter is another facet of it.

Facet of a Class is that division of it which is based on a single train of characteristics. For example, the class "Diseases of Rice Plant" has "Rice Plant" as its personality facet and "Diseases" as its energy facet.

Facet of a Class Number is that part of it which corresponds to a single train of characteristics. For example, J381:4 has 381 as
its personality facet and 4 as its energy facet; J is the basic class number.

Isolate is a division in a facet forming a part of a class. For example, Rice Plant is the personality isolate and Diseases is the energy isolate in the example given above.

Isolate Number is the number denoting an isolate. For example, 381 is the personality isolate number and 4 is the energy isolate number in the class number J381:4.

A punctuation mark or any other preferred symbol such as the colon in the above example, is used to link up the isolate numbers in a class number, is a Connecting Symbol. A connecting symbol does not denote any isolate. It is not a Substantive Symbol, used to denote a basic class or an isolate.

An isolate cannot be a subject by itself, but a basic class or a basic class and isolate(s) taken together is a subject. For example, Agriculture is a subject; Agriculture of potato is a subject; Agricultural Disease is a subject. But Potato by itself is not a subject; it must be attached to a basic class such as Agriculture, or Botany, or Domestic Science to yield a subject.

Facet Relation is the relation between the facets of one and the same class. In class number, it is denoted by a prescribed connecting symbol. For example, in the class number given already, the facet relation is denoted by the symbol colon and represents Energy Facet Relation.

Compound Class is a class which has at least one facet. For example, the class given already as an example is a compound class with two facets.

Phase Relation is the relation between two classes studied together, or figuring in the same class or subject of study, and either of which may be a basic class or a compound class. Complex Class is the class which brings two classes into phase relation. For example, the class "Agriculture for Economists" is a Complex Class. In it, Agriculture and Economics are Phases. The phase relation between them has been called Bias Phase Relation. This is because it denotes the exposition of Agriculture, with such details and in such manner only, which will be of help to a reader whose special field of study is Economics. Again, the class "Difference between Agriculture and Botany" is also a complex class. In it, Agriculture and Botany are Phases. The phase relation between them has been called Difference Phase Relation.

Intra-Facet Relation is relation between two isolates in one and the same facet of a class. This will be illustrated at the end of this paper.

2 FACET RELATION

21 Decimal Classification

Generally speaking, DC enumerates only Basic Classes and Compound Classes with a single facet. This is largely the result of notational exigency. The concept of non-substantive, purely connecting symbols had not taken shape in the pioneering days when the DC was designed. Therefore, a change in the train of characteristics was not possible unless the first train was totally arrested. Occasionally, an unconscious transition from one train to another happened; even then, the first train is arrested from further growth. But in most cases, the schedule enumerated the isolates based on different trains of characteristics as co-ordinate isolates. Thus DC seldom tackled the problem of Facet Relation in the notational plane. It did not provide for non-substantive connecting symbols.

22 Universal Decimal Classification

UDC postulated Quotation Marks, Brackets, and the Equals-Sign as connecting symbols, without values of a substantive nature to represent isolates or basic classes. This enabled it to postulate Time, Space, and Language Facets respectively. Each of these facets admitted of being attached to any host class. Each of these isolate numbers could grow in length - that is represent isolates of decreasing extension - without arresting any other facet of the host class. Thus facet relation appeared for the first time in UDC. But it was only to a limited extent. For, UDC adopted DC as its core. Among the classes already included in the schedules of DC, UDC was not able to provide for facet relation. This meant in effect that UDC could not provide for facet relation between personality, matter, and energy facets. However, wherever
DC had not provided compound classes with energy isolates, UDC introduces provision for facet relation of energy facets, by the device of Analytical Numbers.

23 Colon Classification

CC was the first scheme to be built from the start avowedly on the basis of Facet Analysis and Facet Relation. It has the least of a rigid core. It does not thwart the class number of a class admitting of any number of facets, with full freedom for each facet to grow independently of the others. It increased the potency of its notational mechanism for facet relation by postulating four connecting symbols in its edition 3, in the place of a single connecting symbol of the first two editions. The concepts of Level and Round, developed in edition 4, have increased its versatility by making it possible to represent any number of facets that may be presented by a class of a very specialised nature. Thus, its notational plane is able to keep step with the findings in the idea plane.

3 IMPROVISATION

31 Decimal Classification

When a class presented two different facets, the technique of DC is to ignore one of them and to represent only the other facet in the class number. Differences arose among the practitioners of DC with regard to the facet to be ignored. DC itself did not give any guidance in the matter by specific rules. Merrill collected, in his Code for classifiers, a comparative statement of the differing practices. But he too did not arrive at any guiding principles.

32 Universal Decimal Classification

UDC improvised a notational technique to make a class number co-extensive with the class and expressive of all its facets. It prescribed,

1. Constructing two different class numbers, each representing only one of the two facets; and
2. Combining the two class numbers with the colon as the connecting symbol.

But, it did not make any definite prescription about the sequence in which the two class numbers should be combined. This naturally opened the door for the fault of homonym in the language of class numbers. A convention is sometimes used. The class number, lower in the ordinal scale, should be the earlier constituent in the resulting class number. But this prescription does not respect the Principle of Increasing Concreteness consistently. This principle is known to secure conformity to the Canon of Helpful Sequence.

33 Colon Classification

No doubt the CC has had a notation from the very beginning, which was capable of implementing facet relation and producing co-extensive and expressive class numbers. In the earlier editions, in which only a limited number of facets were envisaged, an ad hoc facet formula was prescribed for each basic class; and this formula happened in most cases to secure conformity to the Principle of Increasing Concreteness. The formula for Chemistry and Law were faulty in the first edition; but it was rectified in later editions. It was also the case in the basic class Library Science. These mistakes demonstrated that dependence on flair was not dependable in all cases. The decision about the sequence of facets ought to be taken at a much deeper level once for all and not left to be taken separately for each basic class. This necessity was reinforced when provision was made for an unlimited number of facets in a class. The situation was met by the postulate of the Five Fundamental Categories, and of the relative concreteness among them. This investigation was continued for a few years in the Annals part of the Abgila, 1 to 3, 1949 to 1953, in the series of articles entitled Optional facets. The residual problem still baffling solution is the prescription of a fool-proof criterion to recognise particular facets as manifestations of personality, matter, energy, space, or time. Constant experience does give some insight into this problem, in particular cases. But, this is not sufficient either for communication among classifiers or even for unerring decision in some subjects. This needs further study.

34 Example

Subject: Physiology of flowering plants
DC No 581.1 or 582.41
UDC No 581.1:582.41 or × 582.41:581.1
CC No 15:3
The awkwardness due to long number is seen in the UDC number, because its DC core allows only the improvisation of coloning entire class numbers, instead of connecting only the isolate numbers as in CC.

4 PHASE RELATION

41 Decimal Classification

When two classes were brought into phase relation and resulted in a complex class the earlier editions of DC had no provision to arrive at a class number co-extensive with and expressive of the complex class. Edition 13 faced this situation. It prescribed .0001 as the connecting symbol to bind the class numbers of the two phases together and thereby give a co-extensive and expressive class number to the complex class. It treats all phase relations alike.

42 Universal Decimal Classification

UDC used colon as the connecting symbol. It is no doubt used also for indicating facet relation. But in most cases, distinction between the two kinds of relations is easy. For, in facet relation, the basic class numbers of both the class numbers forming the phases will be the same. But, they will generally be different in the case of phase relation. UDC too does not distinguish between different phase relations. It treats them all alike.

43 Colon Classification

CC used zero as the connecting symbol to show phase relation. This was in the earlier editions. This provision was made in quite a casual way, without any conscious thought about phase relation or the possible varieties of such a relation. The term Phase Analysis was used for the first time, only in 1943. This term was the heading of Part 3 of my Library classification: Fundamentals and procedure (1944). But even at that time, a clear view of phase relation had not emerged. Consequently mistakes were made.

44 Anteriorising Common Isolate

Anteriorising Common isolates were hastily described as one class of secondary phases; it was further said that they were not in need of a connecting symbol in being attached to the host class number or the first phase. We now know that an anteriorising common isolate belongs only to a facet. The whole of chapter 34 of the Fundamentals should be transferred to Part 2 devoted to Facet Analysis.

45 Energy Isolate by Subject Device

Similarly, an energy isolate got by subject device was hastily described as another class of secondary phases. The connecting symbol prescribed for this was colon, the connecting symbol to denote energy facet. This was called tool phase relation. We now know that the number got by subject device belongs only to a facet and not to a class.

46 Causes of the Mistakes

These mistakes arose out of the absence of a careful definition of phase relation, such as the one now given in this paper, or the one given in the edition 4 of the Colon classification (1952). Therefore, much progress could not be made in phase analysis till after 1952.

5 CORRECT PHASE RELATIONS

51 Bias Phase

Of the three kinds of phase relations described in the Fundamentals, only one stands the test of the present definition. It is the Bias Phase Relation. Here, the exposition of the first phase is biased towards the second phase. That is, the first phase is expounded with such details and such examples only, as will be of interest or of use to one whose chief field of study is the subject forming the second phase. It was only for this relation that zero was used as the connecting symbol.

52 Influencing Phase

However, soon after the Fundamentals was published, P.K. Garde brought to my notice, in one of my visits to Bombay, books on Geopolitics. It was a case of the study of Political Science, a basic class, as it is influenced by Geography, another basic class. To number it as W0U mixed it up with books on Political Science with a bias to Geography. This led to the recognition of a new relation, which we
agreed to call Influencing Phase Relation. I had called it Garde Phase in my Elements of library classification (1945). The chief difficulty was in the choice of a different connecting symbol for this phase relation. We wished to have it nearest to the general treatises on Political Science. We had no notational device in those days, to secure a posterior place; for that had been occupied by the books with bias relation, for which the connecting symbol zero had been used. Therefore, we could only think of an anterior place. \( g \) (Roman small \( g \) followed by \( 8 \)) would give the nearest possible anterior place. It was therefore chosen as the connecting symbol for the influencing phase. That this was faulty will be seen in the next section.

53 Comparison Phase

About 1948, depth classification of micro thought came to be practised in connection with the course in Documentation given to the students of the M Lib Sc class of the University of Delhi. This made us realise the appreciable literary warrant, in the world of micro documents - that is, articles in periodicals and tiny pamphlets containing lectures - for complex classes in which one class of knowledge was compared with another. We were led to recognise this as a new kind of phase relation. We called it by the descriptive name Comparison Phase Relation. This too needed a place near to general treatises in the first phase.

Then, we realised that any ad hoc improvisation would not do. Other phase relations might come to be isolated. This led to the thought that the connecting symbol for any phase relation should be zero. That alone will give to the complex classes formed by phase relation a posterior position next to that of the general treatises. Having decided this, the Roman small \( c \) suggested itself as the specific digit to represent the specific phase relation of Comparison. There was another difficulty in this case. In the two earlier kinds of phase relations, the subject of exposition was obvious, and it was possible to prescribe it as the first phase. But in Comparison Phase Relation, both the phases were on an equal footing. To prescribe for a unique choice, it was decided to choose as the first phase that class whose class number was the smaller ordinal number. All this has been discussed in detail by the lamented Koranne in the Annals part of the Abgila, 1, 1950.

54 Present Position

In spite of this experience, it did not occur that the Bias Phase Relation also should be brought into line with this idea. The case of Influencing Phase Relation was immediately rectified by using zero as the connecting symbol and the Roman small \( g \) as the specific digit for denoting that specific phase relation. But even in the edition 4 of 1952, the Colon classification prescribed only a bare zero to link up the class numbers of the two phases in the case of bias relation. Conservatism also led to the retention of the so called tool phase. Now it is clearly seen that we may venture to make the changes. Accordingly the forthcoming edition 5 incorporates the latest ideas. It has also provided for two other kinds of phase relation - the general relation and the difference phase relation.

55 Rules about Phased Class Number

Rule 8203 of edition 5 reads: "The Class Number of a Two-Phased subject is got by inserting 0 and an appropriate digit representing the phase relation, between the Class Numbers of the First and the Second Phases". Chapter 8 of the Schedules gives the following schedule of phase relations:

- a General
- b Bias
- c Comparison
- d Difference
- g Influencing

56 Universal Decimal Classification

The phase relations are not the creation of CC. Indeed they are not the creation of any scheme of classification. They are intrinsic to the world of expressed, recorded thought. They occur in the idea plane itself. It is the duty of any scheme of classification to implement this finding of the idea plane, in constructing class numbers in the notational plane. The indication of the idea plane, that such complex classes should come immediately posterior to the treatises on the subject forming the first phase, appears to be helpful. "Immediately posterior" means "Before any subdivision of the subject forming the first phase, derived on the basis of a characteristic". If this decision in the idea plane is accepted, some
method must be found for the UDC to implement this decision. The following prescription is recommended for consideration by the UDC Committee of the FID:

The UDC number of a two-phased class should be obtained by inserting a colon and an appropriate digit representing the phase relation, between the class numbers of the first phase and the second phase. The digit for phase relation may be a Roman small as given in the schedule in section 55.

The adoption of this prescription will not come in conflict with any of the existing rules governing the UDC or the current practice.

57 Why Roman Small?

The prescription of Roman small to represent phase relation is just to distinguish it from every other species of substantive digit in use. No difficulty can be thought of as arising out of this in UDC. In CC too, no difficulty can arise in spite of its using a Roman small for a common isolate. If the common isolate is an anteriorising one, it will be preceded by some other species of substantive digit - a numeral or a Roman capital. If it is a posteriorising one, it will be preceded by a punctuation mark. But when it represents a phase relation, it will be preceded by a zero. It may also be stated that closest proximity will be secured to the subject forming the first facet for the following reasons:

1. The postulate that any connecting symbol is lower in ordinal value than any substantive digit, that is than a. (See rule 0253 of edition 5 of the Colon classification)
2. Of all the connecting symbols, zero has the least ordinal value. (See rule 0252).

58 Examples

<table>
<thead>
<tr>
<th>Subject</th>
<th>CC No</th>
<th>Proposed UDC No</th>
<th>Old UDC No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Psychology for teachers</td>
<td>S0bT</td>
<td>159.9:b37</td>
<td>159.9:37</td>
</tr>
<tr>
<td>Influence of psychology on education</td>
<td>T0gS</td>
<td>37:g159.9</td>
<td>159.9:37</td>
</tr>
<tr>
<td>Demonstration of the application of psychology in teaching</td>
<td>T:S</td>
<td>37:159.9</td>
<td>159.9:37</td>
</tr>
</tbody>
</table>

6 INTRA-FACET RELATIONS

61 Concrete Cases

<table>
<thead>
<tr>
<th>Subject</th>
<th>Old CC No</th>
<th>New CC No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Difference between Analytical Conics and the Projective Geometry of Conics</td>
<td>B622:20dB622:7</td>
<td>B622:20n7</td>
</tr>
<tr>
<td>Influence of Projective Geometry of Conics on Analytical Conics</td>
<td>B622:20gB622:7</td>
<td>B622:20r7</td>
</tr>
<tr>
<td>Comparison of Buddhist Rituals with Christian Rituals</td>
<td>Q4:450cQ6:45</td>
<td>Q40:n6:45</td>
</tr>
<tr>
<td>Influence of Buddhistic Rituals on Christian Rituals</td>
<td>Q6:450gQ4:45</td>
<td>Q60:r4:45</td>
</tr>
<tr>
<td>Difference between Rural and City Festivals</td>
<td>Y31:360dY35:36</td>
<td>Y310n35:36</td>
</tr>
</tbody>
</table>
62 Old vs New CC Number

In the first four cases and the last the new CC Number is shorter than the old. This economy is due to the avoidance of repeating the basic class and one of the facets in the new CC Number. This new notational device did not suggest itself for years, since the need for economy was felt in 1943. But even now, one is not quite sure that the interpretation of the new class number into the name of the subject shown against it is a natural one. But we can adopt this interpretation by convention, provided that no other intelligible interpretation is possible. About this, there is need for experiment and experience.

63 Modified Bias

In the fifth and the sixth cases, however, the new CC Number is one digit longer than the old. The old number merely connected the two isolates in the space facet by the then connecting symbol for bias viz Zero. This was called Modified Bias Device, in the Fundamentals. But now we have realised that bias is not the only possible kind of relation between the isolates. The extra digit has been made necessary in order to individualise the various kinds of relations between the isolates. This is quite unavoidable, as the new number has become more fully expressive.

64 The Schedule for Intra-Facet Relations

The relation between two isolates of one and the same facet of a basic class is called Intra-Facet Relation. To every kind of phase relation, there corresponds an intra-facet relation. The schedule for the latter is:

<table>
<thead>
<tr>
<th>General</th>
<th>Bias</th>
<th>Comparison</th>
<th>Difference</th>
<th>Influencing</th>
</tr>
</thead>
</table>

The new isolate formed by combining two facets in the same facet of a class, so as to express the relation between them, is called a Complex Isolate.

65 Universal Decimal Classification

Though a simple device has been suggested to construct co-extensive, expressive UDC numbers for a complex class, it has not been possible to prescribe a similar device to have coextensive, and expressive UDC number for a complex isolate. This is due to the absence of clear cut facets and isolates in UDC, in general. However, the presence of a clear cut space facet and isolates, makes it possible to distinguish the different intra-space-isolate relations by adding a relation number, taken from the schedule in section 64, after the colon within the space facet. This suggestion is recommended to the FID Committee on UDC. But in the other cases, where there is no clear cut facet and the intra-facet relation figures in the notational plane as if it were phase relation, the schedule in section 55 may be used instead of the one in section 64. This difference in treatment in the notational plane for one and the same phenomenon in the idea plane is an additional proof for the need for basing UDC on a full instalment of facet analysis, including personality, matter, and energy facets also. This is also brought out by the structure of the UDC numbers for the subjects given in section 61 and by the far-fetched way in which they have to be constructed to attain co-extensiveness and expressiveness. The UDC numbers are given in the next section, as far as they could be managed.

7 AUTO-BIAS DEVICE

The proposed notational technique to represent intra-facet relation does not come in conflict with the Auto-Bias Device, in which also the isolate within a facet is formed by the combination of two isolates in the same facet. The rules on the latter are given as follows in edition 5 of the Colon classification.

6880 When an isolate is not scheduled in a facet but can be got by combining two of the scheduled isolates, it is called an Auto-Bias Isolate.

6881 The Number of an Auto-Biased Isolate is got by the Auto-Bias Device.

6882 The auto-bias device consists in connecting the numbers of the constituent isolates by a hyphen.

For example, in the personality facet of Y Sociology, 11 is Children, 31 is Rural Group, and 35 is City Group. Then, 11-31 is Rural Children and 11-35 is City Children.
71 Difference between Auto-Bias Isolate and Complex Isolate

The auto-bias isolate does not stand for any intra-facet relation between the constituent isolates. It only stands for an isolate of smaller extension than either constituent got by a lamination of one over the other. This lamination is quite like the lamination of one facet of a basic class over another. By extending the analogy, we may call the isolate got by lamination of two isolates in the same facet a Compound Isolate, in contra-distinction to the Complex Isolate got by combining the isolates by the device for intra-facet relation. Thus, the auto-bias isolate and complex isolate stand for totally different concepts in the idea plane.

72 Versatility

The involved subjects used for illustration in the various sections do have literary warrant in the universe of micro documents, embodied as articles in periodicals, and as monographs of research. The Depth Classification to be used in Documentation Work should be able to provide co-extensive and expressive class number for them. These class numbers should implement the helpful sequence fixed for them in the idea plane. These subjects involve in the idea plane itself phase relations, intra-facet relations, and auto-bias isolates. It is the duty of a scheme of classification, used in documentation work, to implement all of them in the notational plane. It is believed that the notational devices set forth in this paper adds appreciably to the versatility of a scheme of classification.

8 A NEW PROBLEM

Will a complex class behave like a basic class and demand distinctive facets of its own? It is difficult to say now. If literary warrant develops leading to such a demand, the arrester bracket should be added after the complex number and then facets can be added to it, as demanded by the complex class.