Studies some of the problems relating to the concept of 'Common Facets' and 'Phase Relations' as expounded in Colon Classification. Discusses: (1) What groups of terms do in fact appear as common facets? (2) What phase relations may appear between basic classes. Enumerates a greater variety of phase relations required in the depth classification of patents. Isolates some problems for further investigation.

1 INTRODUCTION

The universe of knowledge, according to the views expounded in the Colon Classification, is divided up into a series of Basic Classes. Each basic class may be further divided by the use of one or more trains of characteristic, and the foci derived by the application of each train together constitute a Facet of the basic class. Any facet which can occur in many basic classes is a Common Facet. A specific subject may be formed by combining a basic class with foci from one or more of its constituent facets. It may also be formed by combining two or more basic classes, with or without their associated foci. In this case, the basic classes are said to stand in a Phase Relation, and the nature of the relation can be specified.

In this paper, an understanding by the reader of the practices of the Colon Classification, summarised above, will be assumed. Two main points will be discussed: (1) What groups of terms do in fact appear as common facets? (2) What phase relations may appear between basic classes?

2 COMMON FACETS

The occurrence of terms in more than one basic class is a phenomenon well-known in classification. Phillips, in his Primer of book classification, cites the following example from Dewey.

Eggs

- and nutrition, physiology 612.39283
- as food, domestic economy 614.12
- hygiene 614.28
- cookery 614.665
- Easter, folklore 398.33242
- ornithology 598.2
- painting medium 751.242
- poultry farming 636.513

The phenomenon has led classificationists to devise means of making such terms 'common'! Duff Brown, for example, entered most of the correlations of Eggs shown above in his auxiliary Categorical Tables.

However, the first widely used common facets were the Form divisions, the Chronological, Geographical and Language schedules.
These, generally speaking, are facets which may appear in any specific subject, no matter what its basic class.

21 Facets Not Common to All Classes

The example of Eggs, given above, suggests that there are also terms - in fact, facets - which may appear in a number of basic classes, but not in every basic class. Some of these facets have been recognized in the Colon Classification. For example, the substance facet of chemistry appears in other basic classes. Again, in the fourth edition of the classification Ranganathan has listed two posteriorising common facets which are not necessarily applicable in every class.

22 Facet Formula

In building up a specific subject, the foci are cited in a definite order, generalised as the Facet Formula of the basic class. In the simplest case, the formula cites two or three facets, Personality [P], Matter [M], and Energy [E]. In more complex cases, the Energy facet may introduce a further round of terms, thus: [1P] [1M] [1E] [2P] [2M] [2E], etc. The occurrence of partly common facets at each point in the formula will be examined.

23 [1P] Facet

The nature, the content, the characteristic feature of each basic class is determined by its primary Personality facet. It should therefore be axiomatic that the same facet cannot occur as a primary facet in more than one basic class. This axiom is not obeyed in Colon. For example, the same Substance facet is primary in Chemistry, Technology and Mineralogy. This may mean that the axiom is incorrect. On the other hand, it may mean that the disciplines Chemistry, Technology, and Mineralogy are not truly distinct basic classes. This problem needs further consideration.

24 [1M] Facet

All material Personalities have material constituents. The fact that Substance facets can occur at [1M] in many basic classes is therefore obvious.

25 [1E] Facet

The first-round Energy facet includes the properties of, processes occurring in, actions of and operations on the primary Personality and Matter facets. Some of the Energy foci may be highly specific, applicable to only a few foci within a particular [1P] facet. For example, the biological process known as conjugation is applicable only to certain unicellular animals (Colon focus K25). Other terms may apply to the whole of a [1P] facet, as Excretion does to all Animals.

Now Animals form a natural group of Personalities which collectively make up the [1P] facet of a traditional basic class, Zoology. Traditionally, plants fall into a separate basic class, Botany, yet there are [1E] foci which apply to both groups, e.g. physiology. Further, animals and plants (and their parts) have it in common with inanimate bodies that they are masses, which possess properties such as bulk, shape, strength, elasticity. These are [1E] foci which apply to a number of [1P] facets. Lastly, masses share with atoms and molecules such properties of matter in general as dimensions and density, which are thus [1E] foci of still wider applicability.

The occurrence of partly common [1E] facets is therefore due to the fact that some [1E] foci are applicable to a wider range of Personalities than are contained within any one basic class.

26 [2P] Facet

A second-round Personality focus often plays the role of the agent of an operation specified in the preceding [1P] facet. In principle, any Personality can perform any operation, so we may expect that any [1P] focus can occur as a [2P] focus in another basic class. Such a Personality may be followed by its constituent Matter facet.

26.1 Posteriorising Common Personality

The fourth edition of Colon lists "posteriorising prefirst octave personality common..."
subdivisions"1, covering types of Institution and Business. Any such organisation is in fact an agent for the carrying out of some operation, and as such it may figure as a [2P] facet. It may be applied in principle to any human operation, and is in this way common.

On the other hand, since every Personality may be - and eventually is - studied in and for itself, Institution and Business also figure as [1P] foci. In this role, they occur in the primary facet of a particular basic class (say, Management), which is not more common than any other [1P] facet.

27 [2E] Facet

The second-round Energy facet may be exactly analogous to the first-round, with the same possibility of partly common applicability. Ranganathan's Common Energy terms are of this type. Intellectual activities (Hypothesising, Deduction, Criticism, Detection, etc), Industrial activities (Plan, Trial, Production, Use, etc.), and institutional activities (Function, Deliberation, Administration, etc.) are first or second round energy foci of wide applicability.

However, there are further ways in which a common [2E] facet can be formed.

The [1E] foci, as stated in 25 above, are properties, processes, actions and operations pertaining to the Personality facet. The [2E] foci may be of this type, but they may also be terms applicable to the preceding Energy facet. We have properties of properties and operations thus: Intensity, Stability, Rate, Variation, Limits, Rhythm. We have operations on properties, processes, actions and other operations, thus: Measurement, Initiation, Acceleration, Retardation, Prevention, Control, Stopping, Moderation, Intensification, Stabilisation. These terms are in principle applicable to any Energy focus, so that this group of [2E] foci forms a fully common facet.

3 PHASE RELATIONS

In the Colon Classification, phase relations between basic classes are recognised, and six species are noted: Biasing, Tool, Aspect, Comparison, Influencing, and an indefinite Relation phase. It is also recognised that a similar type of relation may occur within a single basic class - e.g., in Chemistry, the facet formula [1P] [1E] 0 [1P] is used, in which the first [1P] = Substance analysed, [1E] = Analysis, and the second [1P] = Substance determined.

31 Extension of Concept

The concept of Phase Relation needs to be further analysed and extended. The preceding paragraphs have shown that facets and common facets embody relations between the following pairs of categories:

<table>
<thead>
<tr>
<th>Categories linked</th>
<th>Relations embodied</th>
</tr>
</thead>
<tbody>
<tr>
<td>Personality-Matter</td>
<td>Constituent</td>
</tr>
<tr>
<td>Personality-Second level Personality</td>
<td>Part, Organ</td>
</tr>
<tr>
<td>Personality (or Matter) - Energy</td>
<td>Property, Process, Action, Operation</td>
</tr>
<tr>
<td>Energy-Second round Personality</td>
<td>Agent, Tool</td>
</tr>
<tr>
<td>Energy-Second round Energy</td>
<td>Common Property or Operation</td>
</tr>
</tbody>
</table>

But there are other pairs which are not linked by the facet formula: Personality-Personality, Matter-Matter, Energy-Energy. In general, we may postulate that Phase Relations are those existing between terms which both belong to the same category. The two terms so related may occur in the same facet, or they may occur in different facets - i.e., in different basic classes.

32 Variety

The recognised Colon phase relations are mostly of this type. The Bias relation links one basic class with another, both classes being centred on certain Personalities. An Aspect of a category necessarily belongs to that category. Comparison is only possible between two entities in the same category. Close analysis will also show this to be true of the Influencing phase. The Tool relation is perhaps anomalous - it sometimes links Energy with Second-round Personality, but may also
link Energy with Energy (e.g. Calculation is a tool in Design).

But we must recognise that there is potentially a much greater variety of phase relations than Colon has yet provided. The need for these is already being felt in the depth classification of patents, in which very precise relations between machines and between processes must be expressed. The U.S. Patent Office has made some researches into the matter. Their tentative findings are extended here.

33 Logical Relations

Phase relations of the type recognised by Colon may be loosely called "logical relations". As well as Bias, Tool, Aspect, Influence, Comparison, we may recognise such further relations as Cause, Explanation, Use (purpose, functions), Correlation, and the accepted logical relations Not, Or, And, Implication and Inclusion.

34 Temporal Relations

To express the temporal relations of processes and operations, the Patent Office authors (Andrew & Newman, U.S. Patent Office, Research and Development Memorandum, 15 May 1956) have adopted some very fine distinctions. They use the following portmanteau terms:

Syncwith: two processes simultaneous and coextensive.
Syncstart: two processes which begin simultaneously but are of unequal duration.
Syncstop: two processes which end simultaneously but are of unequal duration.
During: shorter process occurring during longer.
Timelap: two processes overlapping.
Timearlier: one process occurring before the other.
Timelater: two processes occurring about the same time.

35 Spatial Relations

If such temporal detail between Energy facets is required, equally detailed spatial relations between Personality facets may prove necessary in depth classification. Some of the terms, I suggest, may be as follows: Personality A can be Beside, Near, Over, Under, Against, Outside, Inside, Coincident with, Overlapping, On, Across, Contained in, Through, Suspended by Personality B, and so on.

It may further be necessary, in the description of machines, to express such spatial relations as Parallel, Inclined, Perpendicular, Tangential, Crossing, Twined, Central, Axial, Radial, etc.

36 Spatio-temporal Relations

Equally detailed relations may need to be expressed between moving objects. Personality A can move Into, Out of, To, From, Above, Below, Through, Around, Within, Onto, Off, along B, and so on.

The value of all these and perhaps other phase relations in depth classification will have to be tested practically.

4 PHASE AND FACET

Distinctions analogous to that between Phase Relation and Facet Relation have been made by Andrews and Newman, and by Perry in his work on machine literature searching. Both have also commented on the fact that certain relations seem to appear in both groups (as Tool above) and that some relations may begin as Phase relations and develop into Facets. How does this come about?

41 Example

Consider a time when very little was known about Optics. The entity Light was known, but little of its behaviour. The invention of a silver mirror leads to a study of reflection. This would first be classified as a phase relation between two Personalities—Light, effect of Silver Surface. The invention of glass plate leads to a study of refraction, classified as Light, effect of Glass Plate. The invention of the Glass Prism leads to the discovery of dispersion, classified as Light, effect of Glass Prism. Phase relations with other personalities are later discovered, corresponding to inter-
ference, diffraction, scattering, double refraction, absorption, etc. Further study shows that all these phase relations of Light occur with many other Personalities, not just the Silver Mirror, the Glass Plate and so on with which they were first recorded. Light, with Matter in general, exhibits a series of "effects". These are eventually named, and grouped to form a set of interactions of Light with Matter. They become an Energy facet.

42 Transformation

The change is effected as follows. The set of empirically discovered phase relations is considered as a whole. The secondary phase (Silver, Glass, etc.) is generalised (to become Matter). At the same time the general phase term "effect" is restricted to a series of enumerated interactions (Reflection, Refraction, etc.). If we represent phase relation by the zero, the original formula is $[1P]_0 [1P]$. The new formula is $[1P] [1E] [2P]$, in which phase relation has become Energy facet, and secondary phase has become second-round Personality.

5 CONCLUSION

This study of Common Facet and Phase Relations has, I hope, specified more closely than hitherto the nature of the problems raised by these concepts, and has suggested some lines of thought which need further exploration.