CHAPTER 2

THE CONCEPT OF FIVE FUNDAMENTAL CATEGORIES AND THEIR DEVELOPMENT

2.0 Introduction

The postulation of the Five Fundamental categories, namely Personality, Matter, Energy, Space and Time, was made by S R Ranganathan in 1944. He made this postulation after analysing about 1,008 different compound subjects. He said, "We come last to a fundamental point bearing on facet analysis. An examination of the facets of different subjects shows that they can all be related to one or other of the five fundamental categories Time, Space, Energy, Matter and Personality. Any analysis ultimately strikes root in them." (110). Before the postulation of the five fundamental categories and its use in the design of the Colon Classification, ed 4 (1952), all the isolate facets other than space and time isolates of a compound subject, were given the same descriptive names depending on the context of the host basic subject. Certain facets now deemed to be manifestations of the fundamental category Personality had a contextual and descriptive name. For example, "Educand Facet" in "T Education"; "Language Facet" in "P Linguistics". The incidence of the manifestation of Matter was zero. They were primarily considered to be Materials constituting the entities. But all the rest of the isolate ideas were uniformly denoted by "Problem" facet. It was later realised that the nondescriptive term "Problem" was used to denote not only action but also properties (115).

In 1952, all these problem isolates were deemed to be manifestations of the fundamental category "Energy". Here, the verbal plane has misled
the idea plane (31, 94). "Energy" was defined to connote action of one kind or another. This created a difficulty. Certain ideas, such as Morphology, Structure, Physiology, Function; Disease, Ecology, Civic rights, and Duty, and Personality, Value - which had been labelled "Problem" till 1990 and were deemed "Energy" till 1952, did not connote action (94, 95).

Ranganathan in 1957 presented this uncomfortable thrust into Energy manifestations in the following terms: "Till now attributes - such as, density, elasticity, specific heat, and other physical attributes; valency, affinity, atomic weight, bond, taste and other chemical attributes - have been treated as manifestations of Energy. This has not been found satisfactory. Such an attribute is an abstract part of a whole. It is distinguishable from its whole, though not separable. An attribute part is obviously not a portion of the whole according to the definition of "portion". Nor can it be taken to be an organ of the whole. For an attribute may occur in the members of many different universes. Can we then regard attributes as constituents of wholes? If so, can we treat them as if they are matter? If we use "matter" according to its common usage, we cannot do so. But what we do is to postulate "matter" as a fundamental category capable of manifesting itself as the "constituent of a whole". We have to test the helpfulness of such a postulate in meeting the problems in classification. If it proves helpful, we can admit it" (115). Thus, after 1958, it was found appropriate and helpful to deem properties to be manifestations of the fundamental category Matter (91, 99, 111). Roget's Thesaurus also suggests the same (145). Thus, two kinds of manifestations of Matter
are possible, and they may be distinguished as Matter (Material) and Matter (Property). Thus Property isolates such as morphology, structure are now deemed to be the manifestation of (PC) Matter. Many of the difficulties in the idea plane associated with the "problem" facet have nearly disappeared (91, 99, 111).

One of the first problems in the change of the manifestations of fundamental category Matter is the sequence of Matter (Material) and Matter (Property). Since the sequence P, M, E, S, T is based on the principle of decreasing concreteness (128), the same principle may be applied in this case also. Among the isolate ideas deemed to be Matter (Material) and those deemed to be Matter (Property) the former is more concrete than the latter. Therefore, the sequence should be, Personality, Matter (Material), Matter (Property), Energy, Space and Time. The Wall Picture Principle (103) confirms this sequence.

Speaking on the development of fundamental categories, D J Pickett says, "In order to find a sound theoretical basis for the choice and sequence of facets in a scheme, Ranganathan advanced the solution of relating facets to a set of fundamental abstract notions which he called time, space, energy, matter and personality. Every facet of a basic class is a concrete manifestation of one of these. The Time facet is for chronological division; the space for geographical division; these are clear and are to be found virtually in every classification scheme. Energy and Matter, illustrated in technology by raw material and process, are not so easily identified in some other subjects in the social sciences and humanities. For
example, Personality, if interpreted as the end product in a technology, or the educand in education, can be seen to be recognisable entity with an identity that is unique and clearly separable from other entities, but it has certainly caused more difficulty and controversy than any of Ranganathan's other fundamental categories. Nevertheless, for him it is the most important of the categories, since it is the Personality facet that contains the terms that give the class itself its own identity in the field of knowledge" (28). In a recent paper D J Foskett highlights the role of Personality in the context of the systems theory.

He says "In a general classification for documentation, any system can be named a Basic Class, in DRTC terms, because all systems can be analysed by facet analysis. The system itself, considered as a whole, becomes the Personality. Its constituent parts and the relations between them become Matter and Energy, which I will call Energy A. The relations of the system with its environment are also processes which I call Energy 3. The other systems in the environment, which react with our original system are Agents or, in Ranganathan's own terms. Second Round Personality". Of course, we do not have to accept Ranganathan's own terms; I do so here in order to illustrate how appropriately systems theory fits the scheme of the greatest contributor to documentary classification since Bliss and Dewey" (29).

2.1 Work on Personality Isolates

Recognition

According to Ranganathan, "Personality" is the most ineffable one for
definition (110, 127). However, it is deemed to be most concrete among
the fundamental categories. It is the Personality isolate - special to a
Basic subject - that gives content to a basic subject. For example, the
cultivar facet, such as Rice, Wheat, Barley, Potato, Sugarcane, that gives
content to the Basic subject Agriculture. The recognition of the manifes-
tation of Personality, at Basic subject level, becomes context specific.

In 1952, Ranganathan recognised that a class formed of some whole en-
tities of a universe should be distinguished from a class formed of some
organs of remove 1 of a typical whole entity of the universe. It was dis-
covered that it is improper to treat different isolates formed of whole en-
tities on the basis of different characteristics as belonging to different
levels. It was further recognised that these two should be treated as suc-
cessive levels of facets within a Round. Experience with this concept has
been largely confined to Personality isolates. But, further research on
this concept was not pursued till 1963, probably due to poor versatility
of the notational system.

In 1963, it was realised (102) that the entities of universe, figuring
as Personality isolates, admit of being grouped on the basis of several
characteristics yield whole entities. For example, the universe of automo-
biles admits of 221 characteristics, each yielding whole automobiles (83).

Here are a few examples:

<table>
<thead>
<tr>
<th>Characteristics</th>
<th>Examples of Isolates</th>
</tr>
</thead>
<tbody>
<tr>
<td>By number of doors</td>
<td>Two doors, four doors, six doors</td>
</tr>
<tr>
<td>By type of body</td>
<td>Sedan, Limousine, Dart back</td>
</tr>
<tr>
<td>By kind of engine</td>
<td>Petrol engine, Diesel engine, Electrical</td>
</tr>
<tr>
<td></td>
<td>engine</td>
</tr>
<tr>
<td>By purpose</td>
<td>Racing, Passenger, Military</td>
</tr>
<tr>
<td>By brand</td>
<td>Ford, Rolls Royce</td>
</tr>
</tbody>
</table>
The combination of those characteristics produced compound concepts, but yet being qualifiers for the whole entity, automobile, such as Ford-Racing car, Gasoline-powered Sedan car, Ford-Racing Gasoline-powered Sedan Four-door car. Such a combination is regulated by the Wall Picture Principle. Based on these developments, experiments were done on the design of schedules. About 2.15 depth classification schedules (34) for a variety of subjects have been developed.

When the number of qualifiers to a whole concept were few, say not more than ten, the helpful sequence could be determined on the basis of the Wall-Picture Principle. In the case of Production Engineering of Machine Elements, such as screw, nut and bearing, Abdul Rahman, Afroz Fathima and Ranganathan have found that the direct application of the Wall-Picture Principle is helpful (1-3). But when the number of qualifiers is fairly large, the application of the Wall-Picture Principle becomes tedious. Therefore, it is more helpful to group the qualifiers on the basis of an affinity. A Neelamegha and M. A. Gopinath have named this "Group strategy" (76, 78). Further, even the formation of the groups need not be left to the flair of an individual. Two objective methods of forming the groups have been found.

1. PMEST-based Grouping: When the number of qualifiers does not exceed, say forty, Neelamegha and Gopinath have found that in the case of many commodities, it is helpful to correlate each qualifier with one and only one of the five fundamental categories Personality, Matter, Energy, Space and Time. Here are some examples taken from the schedule of "Diesel Engine Production Engineering" (76).
Qualifiers Correlated with Fundamental Category

<table>
<thead>
<tr>
<th>Qualifiers</th>
<th>Correlated with Fundamental Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>By purpose</td>
<td>Personality</td>
</tr>
<tr>
<td>By Compression ratio</td>
<td>Matter (Property)</td>
</tr>
<tr>
<td>By Fuel injection</td>
<td>Energy</td>
</tr>
</tbody>
</table>

The sequence of Personality Group, Matter (Property) Group, etc is determined by the Postulate of Sequence within a Round (129).

2. Organ-based Grouping: When the number of qualifiers is more than, say forty, Neelameghen and Gopinath have found that it is helpful to group the qualifiers into large groups, for instance on the basis of the whole commodity and each of its organs to which they are specific (78). Here are some examples taken from the schedule of "Motor Vehicle Production Engineering".

<table>
<thead>
<tr>
<th>Qualifiers</th>
<th>Correlated with</th>
</tr>
</thead>
<tbody>
<tr>
<td>By Weight</td>
<td>Whole</td>
</tr>
<tr>
<td>By Length</td>
<td></td>
</tr>
<tr>
<td>By Speed</td>
<td></td>
</tr>
<tr>
<td>By Number of doors</td>
<td>Organ</td>
</tr>
<tr>
<td>By Material of seat cover</td>
<td></td>
</tr>
<tr>
<td>By Brand of tyre</td>
<td></td>
</tr>
</tbody>
</table>

The organ-based groups are arranged among themselves in the sequence obtained for the organs on the basis of the Principles for Helpful Sequence (120). If any of the groups contain more than ten qualifiers, as a second step, such a group is divided into PMEST-based subgroups. Thereafter, the
Wall-Picture Principle is applied to arrange the qualifiers within which the ultimate group is formed in this way (76, 78).

Studies on the clearer definitions of the Personality are continuing. The concept of core component and deeming it to be the manifestations of the fundamental category Personality has been suggested by A Neelameghan (56). In fact, such an analogy fits in well with the "Leading Part" in a centralized system. Neelameghan and Gopinath (74) have suggested that the entity forming the focus of study in all subjects going with a basic subject may be called "core component". The following observations made by them in the study of interdisciplinary subjects suggest some clues for the recognition of the manifestations of Personality and in particular, its role in arranging helpful positions for the new basic subjects.

1. The core component is essentially helpful in determining the basic subject with the compound subjects that may go together.

2. In the pattern of arrangement of various properties, actions, etc are based on the focal Personality facet.

3. The difference between basic subjects is normally highlighted in respect of the Personality facet. For example, in the compound subjects going with Analytical Chemistry, the different "methods of analysis" is to be Personality, while the same concepts are treated as qualifiers to Energy facets in the case of compound subjects associated with General Chemistry (37).

The basic issue, then, in the recognition of the manifestations of Personality is the context of the subject -- the basic subject context --
that is important. Norman Roberts (143) in his extensive survey of the definitions identifies the lack of clearcut definition of Personality. He is, however, expecting a non-class intensive definition of Personality. Such a definition is provided in Chapter 8 of this thesis. This thesis also provides a typology of qualifiers going generally with Personality isolates (See Chapter 11).

2.2 Work on Matter Isolates

2.2.1 Matter Material

"Material" denotes the constituent of an entity or idea. It is a common constituent for several entities. The raw materials used for the production of commodities and the chain of materials that got transformed in relation to a commodity in the chain can be successively deemed to be the manifestations of the fundamental category Matter (126). Material isolates are generally in two varieties, Special Material isolates and Common Material isolates. Since most of the material isolates are common materials, it will not be necessary to construct de novo a schedule for material isolates of the compound subjects going with a particular basic subject. At the Dorking Conference, Ranganathan said "To meet the pressure from the industry in the least wasteful way -- that is, to avoid doing something temporarily from time to time and undoing it equally often --, in addition to the schedule of common isolates of properties, we should also work out the schedule of materials, semi-commodities, and services of all kinds (109). As far back as 1953, T N Korrane worked in on common material isolates. He worked on the basis of George Watt's Dictionary of the economic
products of India. In 1862, A Krishnan and S R Ranganathan started developing the material schedules. Since 1963, the work on the design of depth classification schedules for the classification of compound subjects going with each of the several basic subjects especially those going with the Commodity Production Engineering and Commodity Production Technology, has brought to the surface the acute need for a common schedule for Matter (Material) isolates. Therefore, to have a feel of the work on a schedule of Common Material isolates, A K Gupta started work on this project (43). He started with the raw materials described in the Wealth of India, a dictionary of economic products of India, published by the Council of Scientific and Industrial Research, India. The first problem for him was to choose the first characteristics on the basis of which the material isolates in the array of order 1 may be grouped. He found the following six characteristics as possible:

a) Taxonomy;
b) Sequence of Main subjects in the Colon Classification;
c) Utility;
d) Ultimate commodity;
e) Industry; and
f) Origin of the substance

The relative helpfulness of the above mentioned grouping is yet to be examined.

2.3 Work on Matter (Property) Isolates

A property is an attribute of an entity. Specific subjects in any
subject-fields have properties incident in the subject. Property isolates are among the frequently studied aspects of entities, particularly in the fields of science and technology (21, 44, 59, 100, 138). This is evidenced, for example, by the increasing number of data books listing the properties of various kinds of materials and phenomena. Property isolates may be of two kinds: Common property isolates and Special property isolates. The special isolates to be enumerated in the schedules of a scheme for classification of a compound subject going with a basic subject have been found to be few. The number of isolates in the schedule of common property isolates will be fairly large. However, once the schedule of common property isolates is drawn up, the enumeration of special property isolates required in the schedules of a scheme for classification of compound subjects going with a basic subject will be facilitated through the use of mnemonics. The number of isolates in the schedule of special property isolates is not likely to increase rapidly (38, 75, 79, 90, 138).

Since most of the property isolates are common ones, it was realised that the productivity in the design work would be increased if a schedule of common property ideas is developed (See Chapter 11 for a full schedule). This would avoid denovo enumeration of property isolates in the schedules of each subject. They can be conveniently formed according to the Principle of Semina Equivalence (70, 113). It is also to be remembered that a property observed to be specially associated with a particular entity may become a common isolate at a later stage, when similar observations of other entities are made.

The first attempt towards developing a common property schedule was
made in 1958. Then most of the common property isolates were grouped into
the following five groups:

a) Mathematical properties;
b) Physical properties;
c) Chemical properties;
d) Biological properties;
e) Values.

These belong largely to natural sciences (99). It was thought that there
was not enough experience in building up schedule of property isolates
(values) for social sciences. Even in natural sciences, some of the pro-
properties such as Engineering properties were not taken into account. The
first schedule in the grouping was made in 1958 (99). A common property
schedule of largely mathematical and physical isolates was designed. The
arrangement of the property isolates were according to the different basic
subjects they correlated with. The following are some examples:

<table>
<thead>
<tr>
<th>SN</th>
<th>Property Isolate</th>
<th>Correlated with the Basic Subject in CC</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Vibration</td>
<td>B7 Mechanics</td>
</tr>
<tr>
<td>2.</td>
<td>Resonance</td>
<td>C3 Sound</td>
</tr>
<tr>
<td>3.</td>
<td>Fluorescence</td>
<td>C5 Light</td>
</tr>
<tr>
<td>4.</td>
<td>Resistance</td>
<td>C6 Elasticity</td>
</tr>
<tr>
<td>5.</td>
<td>Solubility</td>
<td>E Chemistry</td>
</tr>
</tbody>
</table>

This is being used in several Colon Classification division schedules (44,

Further developments in the design of common property schedules were
made during 1967-79. This was largely confined to very general properties which may not be unequivocally correlated with any one basic subject. The groups were created by correlating each property isolate with either the fundamental category Time, or Space or Energy or Matter or Personality (75). This procedure is used purely for arrangement. The following are a few examples:

<table>
<thead>
<tr>
<th>SN</th>
<th>Property Isolate</th>
<th>Correlated with the Fundamental Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Chronology</td>
<td>Time</td>
</tr>
<tr>
<td>2.</td>
<td>Symmetry</td>
<td>Space</td>
</tr>
<tr>
<td>3.</td>
<td>Physiology</td>
<td>Energy</td>
</tr>
<tr>
<td>4.</td>
<td>Intensity</td>
<td>Matter</td>
</tr>
<tr>
<td>5.</td>
<td>Representation</td>
<td>Personality</td>
</tr>
</tbody>
</table>

Further investigations were done in the grouping of property isolates by blending the two approaches, namely:

1. Correlating with the schedule of basic subjects in the Colon Classification; and

2. Correlating with one or other of the five fundamental categories.

In 1968, as a case study, the grouping of physical properties of electrical and electronic materials was made, blending the above mentioned two approaches (38). It was found that it is helpful in grouping, to correlate first with the schedule of basic subjects and after completely exhausting the use of this characteristic for arrangement, the correlation of the properties falling within a group of basic subjects can be made with any one of the five fundamental categories for deciding the sequence within the
group. Further investigations are on to clarify some of these problems in grouping of property isolates. This thesis aims at developing a comprehensive schedule of common property ideas (See Chapter 11).

In another investigation, the concept of property ideas as a kind of sub-facet, attachable to different isolate facets, was discussed by Neelameghan and Gopinath (77).

2.4 Work on Energy Isolates

The latest definition of the concept of the fundamental category Energy is that it connotes some kind of action. In 1952, "Energy" was defined to include "Problem, Action, Quality, etc" (94, 95). In 1960, as if to justify the inclusion of some of the isolate ideas which prima facie do not connote any action, Ranganathan stated, "Generally speaking, Energy manifests itself either as action, interaction, or mutual action of some kind or as one of the isolates postulated to be Energy, such as those denoted by the terms 'Morphology', 'Physiology', 'Disease', 'Ecology', 'Phylogeny', 'Ontogamy and their equivalents' (96). These were, of course forced concepts. As indicated in the foregoing paragraphs, the concept of Energy was steadily being examined towards clarifying the connotation.

The problems in clearly defining "Energy" was sensed even in 1952. In that year, Vickery indicated that an idea deemed as a manifestation of Energy was multiple and not single. He suggested replacing "Energy" by more than one fundamental category. He wrote to Ranganathan about it and suggested the connecting digit "_" for property isolate. But the separation of "Action" and "Property" and "Action" and "Personality" was found
difficult in many cases. Ranganathan then felt that it was more "a case where we can divide but may not be able to rule" (111). Subsequently, in a paper on the classification of subjects in chemistry, Vickery made out a strong case for differentiating between "Property" and "Action" at least in the field of chemistry (152).

The problem of separating Energy and Property came up again in 1959. While preparing the schedule of a common property isolates, one of the methods used to select such isolates was through an examination of the isolates in the schedules of Colon Classification. It was noted "that the Energy Special isolates yielded many correlates as common property isolates" and "that some of the isolates enumerated as special isolates in the Energy schedule in Physics and Chemistry were a mixture of special Energy isolates and common property isolates. But this problem, however, did not easily lend itself for rectification. Further work is necessary to examine all the schedules from this angle" (90). In 1966, while preparing the Prolegomena ed 3, the problem was thought afresh. The earlier error was traced to a trickery of the verbal plane, which was detected and rectified in 1966. It was clearly defined that an isolate deemed to be a manifestation of the fundamental category Energy should connote action qua action (125).

Energy isolates may be of two kinds (61, 102):

a) Common Energy Isolates; and

b) Special Energy Isolates.

The common energy isolates are those isolates that are capable of becoming energy isolates of compound subjects going with any basic subject.
The special energy isolates are those that are capable of becoming energy isolates of compound subjects with any one basic subject.

The special energy isolates to be enumerated in the schedule for compound subjects going with a basic subject have been found to be a few. On the other hand, the ideas in the common energy isolates will be fairly large in number.

Since most of the Energy isolates are common energy isolates, it was realised that the productivity in the design work would be increased if a schedule of common energy isolates was drawn up with isolates arranged in a helpful sequence. This would avoid de novo enumeration of the common energy isolates in each of the basic subjects. Only special energy isolates for a subject may have to be enumerated. These will be a few for each subject and can conveniently be formed according to the Principle of Seminal Equivalence (70, 113). The full schedule of common energy ideas is presented in the thesis (see Chapter 11).

2.5 Work on Space Isolates

The concept of the fundamental category "Space" is in accordance with what is commonly understood by that term. The surface of the earth, the space inside it, and the space outside it are manifestations of the fundamental category "Space". The usual geographical isolate ideas, such as continents, countries and districts, are taken to be manifestations of the fundamental category Space. Physiographical Isolate Ideas, such as desert, prairie, rain-forest, plateau, mountain, river and lake, are also taken to be the manifestations of the fundamental category Space. In 1937, Rangathan postulated that there can be more than one level of manifestation of
the fundamental category "Space". The isolates such as physical features, physiographical isolates and population cluster may be taken as level 2. Isolates such as continents and country are taken to form level 1 of Space Isolates (124, 131). Space isolates are generally taken to be common isolates. Special space isolates occur rarely. An exhaustive schedule of level 1 of Space Isolates has already been developed. But due to impermanent political conditions, changes in the sovereignty of a territory goes on changing and this affects the schedule of space isolates. Therefore, revision of space isolates from time to time has been found imperative (41). A comprehensive schedule of levels later than level 1 of space isolates is still in the developmental stage (41, 97, 131, 132).

2.6 Work on Time Isolates

The concept of the fundamental category Time is in accordance with what we commonly understand by the term 'Time'. The usual time isolate ideas, such as millineum, century, decade, year and so on, are its manifestations. Time isolate of another kind, such as day and night, seasons such as wet, dry and stormy, are also taken as manifestations of the fundamental category Time (123, 133).

There are different systems for measurement of Time. The formation of time isolate ideas differs from system to system. Therefore, the schedule of Time isolates will be made up of a number of small schedules, each derived on the basis of different system characteristics. However, a scheme for classification can choose a particular system of Time (134). The other systems may be represented by an equivalent period in the favourable system. In 1956, Ranganathan postulated that there can be more than one
level of manifestation of the fundamental category Time. The isolates
such as day, night, summer, winter, wet, dry and stormy, may be taken as
level 2 of Time. Isolates such as millennium, century, decade and year may
be taken as level 1 of Time isolates (97, 136).

Special Time isolates are likely to occur in specific schedules. It
may be one such as Embryonic Period of Human Foetus. However, schedules
for special time isolates are being developed. Nevertheless, an exhaus-
tive schedule of common Time isolates has been developed (97, 136).

2.7 Concept of absolute syntax

Ranganathan suggested a facet syntax, free from linguistic influences,
for compound subjects. Such a syntax should reflect the arrangement of
ideas that can simulate the mental process of a normal human intellect (m).
It is an Absolute syntax (106). Neelameghan investigated this problem.
He found several parallel approaches in formal linguistics to the deep
structure of sentence (71). Sestharama has done a comparative study of
the categories. He found that Ranganathan's approach is more general than
others (146). Further investigation in this line has to be promoted. It
may call for interdisciplinary team research by specialists in linguistics,
developmental psychology, neurophysiology, biocybernetics, and system ana-
lysis. This, of course, would help the development of an abstract classi-
fication. At present, it is hypothetical.

2.8 Scope of the Thesis

This thesis is an attempt to identify the difficulties that are likely
to crop up in the recognition of manifestations of the fundamental categories
Personality, Matter and Energy. The study is further confined to the interdiscipli­

disciplinary or multidisciplinary subjects. The types of problems incident in the study are presented in Chapters 6 and 7 of this dissertation.