

Modes of Formation of Subjects : Fountain-Head of Concept Organisation in Indexing Languages

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Concept relationships in indexing languages are of two kinds — semantic and syntactic. Points out that conceptual foundations of these relationships are discernible in the canons, postulates and principles developed by Ranganathan and the source of canons, postulates and principles lies in his modes of formation of subjects. Mentions that these modes contain in them the seeds of semantic and syntactic relations and Modes of Formation of Subjects represent a typology of relations and act as guiding ideas in recognising and formulating relations among concepts constituting a subject, serving as laws of higher order. Concludes that canons, principles and postulates of indexing languages are deducible from them.

0 INTRODUCTION

The foundation of information retrieval is subject analysis. Subject analysis ultimately leads to the construction of a vocabulary control device like a classification scheme or thesaurus with a set of rules of syntax. A vocabulary control device is also referred to as "Indexing Language".

The end product of subject analysis assisted by an vocabulary control device or indexing language, is a structured subject statement or proposition. A structured subject statement consists of terms. Terms stand for concepts. Concepts combine in the statement according to a pattern of relationship. Soergel remarks that "there are many relationships among concepts, that make up the index language structure. This structure serves essential functions in indexing, data base organization, and searching."¹ He groups these relationships into two categories:

- (a) Hierarchy; and
- (b) Concept Combination

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W.J. Hutchins³ categorisation of relationships consists of the following three broad groups :

- (a) Paradigmatic relations such as genus-species, whole part antonymy etc.;
- (b) Syntagmatic relations (Associative relations) ; and
- (c) Free syntagmatic relations.

According to Bhattacharyya³, a subject proposition consists of three kinds of structural relationships, besides synonymic, quasi-synonymic and antonymic relations. These are :

- (a) Semantic structure — it includes genus-species, whole-part and inter-facet relationships.
- (b) Elementary structure — it means the dimension of categories to which the constituent concepts of a subject statement belong.
- (c) Syntactic structure — it stands for the sequence of constituent concepts in a subject statement.

Derek Austin⁴ distinguishes two kinds of relationship — one operating at the level of the concept, and the other concerned with the combination of concepts. He labels first of these as semantic or thesaural relationships and the second as syntactic relationships.

A.C. Foskett also recognises that "there are two kinds of relationships between terms that we have to take account of : the recognition of terms denoting related subjects such as water, sea and river, and the association or coordination of otherwise unrelated terms to represent composite subjects. . . The first kind are known as semantic relationships, while the second are called syntactic."⁶

Thus it is apparent that concept relationships in indexing languages are of two kinds ; semantic and syntactic. While the semantic relationships help and improve the recall performance, the syntactic relationships improve the relevance performance.

1 CONCEPTUAL FOUNDATION OF RELATIONSHIPS

The next question to be probed concerns the conceptual foundations of the relationships inherent in the structure of indexing languages. A search for such a foundation leads us to an enquiry into the feasibility of certain Normative Principles. Such normative principles are discernible in the Canons, Postulates and Principles developed by Ranganathan⁶.

According to Ranganathan, Normative Principles serve as guiding ideas and "a guiding idea is supplied by intuition. It does not admit

of the qualifiers "right or wrong". The only qualifiers applicable are "helpful or unhelpful"⁷. They are valid till found helpful. His Normative Principles form a hierarchy, where principles of lower level are deducible from the principles of higher level. The hierarchy⁸ consists of the following levels :—

- Basic laws;
- Fundamental laws;
- Canons of classification;
- Principles for Isolate sequence;
- Postulates for classification; and
- Principles for facet-sequence.

Out of these levels, Canons of classification, Principles for Isolate Sequence, Postulates for Classification and Principles for Facet Sequence form a hierarchy having direct relevance to the structure of indexing languages. They act as guiding ideas to express semantic and syntactic relationships. Whereas Canons of Classification and Principles for isolate Sequence guide semantic relationships, Postulates for Classification and Principles for Facet Sequence guide syntactic relationships. However, the hierarchy appears to be incomplete without recourse to certain laws of higher level, which contain in them the seeds of semantic and syntactical relationships. Such laws can be traced in the Modes of Formation of Subjects⁹ as enunciated by Ranganathan.

2 MODES OF FORMATION OF SUBJECTS

Modes of Formation of Subjects represent a typology of relations and act as guiding ideas in recognising and formulating relations among concepts constituting a subject. Ranganathan had been able to recognise twelve Modes of Formation of Subjects. They are : Loose Assemblage 1, Loose Assemblage 2, Loose Assemblage 3, Lamination 1, Lamination 2, Fission, Dissection, Denudation, Fusion, Distillation, Clustering/Subject Bundle, Agglomeration/Partial Comprehension.

According to Ranganathan, a subject is "an organised or systematised body of ideas, whose extension and intension are likely to fall coherently within the field of interest and comfortably within the intellectual competence and the field of inevitable specialisation of a normal person"¹⁰. In other words, subject is a segment of knowledge whose extension and intension are limited by the various capacities of a normal person. Subjects are of three kinds : Basic Subject, Compound Subject, and Complex Subject. A Subject consists of ideas, or concepts. Ideas are primarily of three types: Basic Subject Idea, Isolate Idea and

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Speciator Idea. Isolate ideas are of different varieties. His Postulate of Five Fundamental Categories with concept of Rounds and Levels is well known in this context. Ideas combine in a subject in various modes. There is need to dive deeper to seminal level and recognise some fundamental patterns of combination of ideas or Modes of Formation of Subjects. The modes thus constitute a fundamental contribution of Ranganathan at the seminal level.

Loose assemblage of kind 1 represents a relation when two Basic Subjects or Compound Subjects are studied in mutual relation. This type of relationship gives birth to a Complex Subject, e.g., Mathematics for economists.

Loose assemblage of kind 2 and kind 3 represent the pattern of relationship when two concepts/isolate ideas are brought into mutual relation from the same facet or array respectively. Such a relationship results in the formation of a Complex Isolate Idea, e.g., Influence of Buddhism on Hinduism, Comparative Study of rural and urban Sociology.

Lamination represents the mode of relationship, giving birth either to a Compound Subject or a Compound Basic Subject or a Compound Isolate. A Compound Subject is formed by combining any number of Isolate ideas with a Basic Subject, e.g., Emotional disturbances in children. Such a compound subject is the result of Lamination 1. A compound Basic Subject is the result of Lamination 2, which is formed by compounding two or more Basic Subjects, e.g., Quantum theory of heat. A Compound Isolate is the result of laminating two or more isolates from the same facet over each other, e.g., Middle class urban women. This phenomenon can be labelled as Lamination 3.

Fission represents the mode of relationship when an isolate or a Basic Subject is born by fragmentation process from its parent isolate or Basic Subject. It includes Denudation and Dissection, while Denudation stands for chain relationship, Dissection denotes array relationship.

Modes of relationships representing Fusion, Distillation, Clustering and Agglomeration, though recognised so far at the Basic Subject level, have also wide potentialities for isolate level. Fusion is discernible in the formation of subjects like Biochemistry, Geochemistry, Econometrics, etc., where two subjects are fused together in such a way that each of them loses its individuality.

Distillation represents the mode covering subjects like Museology, Policy Science, Systemology, Research Methodology, etc., which first appear as an isolate idea in various disciplines and gradually develop into an independent discipline or Basic Subject, having its own teaching departments, societies, institutions, and periodical publications.

Clustering is the mode, necessitated by inter-disciplinary team research and observable in the formation of subjects like Ocean Sciences, Material sciences, Hydro Sciences, Defence Sciences, Space Sciences and Area Studies, etc. Such subjects are born when specialists from different disciplines focus their attention on a phenomena or an entity.

Agglomeration represents the formation of a subject by the process of collecting together subjects into larger masses. Examples of such subjects are : Natural Sciences, Mathematical Sciences, Social Sciences, etc.

3 MODE-SOURCE OF NORMATIVE PRINCIPLES

Thus, after observing the interpretation and role of Modes of Formation of subjects, let us again take the thread back to the hierarchy of Normative Principles relevant for indexing languages. Since Modes act as guiding ideas for recognising relations between any two components of a subject and the seed of all semantic and syntactic relations is contained in them, logical sequence of the hierarchy, naturally, stems as follows :

1. Laws of Modes of Formation of Subjects;
2. Canons of Classification;
3. Principles for Isolate Sequence;
4. Postulates for Classification; and
5. Principles for Facet Sequence

In this hierarchy, Canons, Principles and Postulates from level 2 to 5 are specific expressions of the various Modes. They are deducible from Modes as shown in the following table 1.

Table 1

Sl. No.	Name of the Mode	Relevant Canons/Principles/Postulates Deducible
1.	Loose Assemblage	Postulates for Classification
2.	Lamination	Postulates for Classification
3.	Fission	Canons of Classification and Principles for Isolate Sequence
4.	Fusion	Postulates for Classification
5.	Distillation	Postulates for Classification
6.	Clustering	Postulates for Classification
7.	Agglomeration	Postulates for Classification

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The phenomenon of semantic and syntactic relations, guided by Canons, Postulates, and Principles having their source in Modes of Formation of Subjects and deducible from them, can be also depicted as presented in Table 2.

Table 2

Sl. Modes of Formation No.	Types of relation: Semantic Syntactic	Canons/Principles/Postulates	
<i>Postulates for Classification</i>			
1. Loose Assemblage } 2. Lamination } 3. Fusion } 4. Distillation } 5. Cluster } 6. Agglomeration }	Syntactic relation	1. Postulate of Basic Facet 2. Postulate of Isolate Facet 3. Postulate of Fundamental Categories 4. Postulate of round for Energy 5. Postulate of rounds for Personality and Matter 6. Postulate of round for Space and Time 7. Postulate of level 8. Postulate for facet sequence 9. Postulate of first facet 10. Postulate of Concreteness 11. Postulate of facet sequence within a round 12. Postulate of facet sequence within last round 13. Postulate of level cluster	
<i>Principles for facet Sequence</i>			
7. Fission		Semantic relation	<i>Canons for Characteristics</i> 1. Canon of differentiation 2. Canon of concomitance 3. Canon of relevance

4. Canon of ascertainability
5. Canon of permanence
6. Canon of relevant sequence
7. Canon of consistency

Canons for Array

1. Canon of exhaustiveness
2. Canon of exclusiveness
3. Canon of helpful sequence
4. Canon of consistent sequence

Canons for Chain

1. Canon of decreasing extension
2. Canon of modulation

Canons for Filiatory Sequence

1. Canon of subordinate classes
2. Canon of coordinate classes

Canons for Verbal Plane

1. Canon of context
2. Canon of enumeration
3. Canon of currency
4. Canon of reticence

Principles for Isolate Sequence

1. Principle of later-in-time
2. Principle of later-in-evolution
3. Principle of spatial contiguity
4. Principle of bottom-upwards
5. Principle of top-downwards
6. Principle of left to right
7. Principle of right to left
8. Principle of clockwise direction
9. Principle of counter-clockwise direction
10. Principle of periphery to centre
11. Principle of centre to periphery
12. Principle of away from position
13. Principle of increasing quantity
14. Principle of decreasing quantity
15. Principles of increasing complexity
16. Principle of canonical sequence
17. Principle of literary warrent
18. Principle of alphabetical sequence

4 ANNOTATION

(i) There is no specific postulate enumerated so far for Loose Assemblage. While explaining the postulate of Basic facet, Ranganathan remarks that "a subject may have two or more Basic Facets. Then it will be a case of phase relation between the Basic Facets themselves or between the Compound Subjects of which they are respective Basic Facet¹¹".

This explanation does not cover Loose Assemblage 2 and Loose Assemblage 3. It reflects upon the need of a separate postulate covering all manifestations of loose assemblage. Such postulates can be formulated as follows :

"In a subject two Basic Facets or two Compound Subjects or two Isolate Ideas from the same facet or array can occur involving relationship. The relationship can be one of the six types: general, bias, comparison, difference, influence, and tool". To it, one more relationship can be added as "if and then".

(ii) Lamination claims to have 13 Postulates and 4 Principles. A bibliometric study of contribution in the field of information retrieval and indexing languages will reveal that maximum studies have been conducted on structuring of Compound Subjects. Its incidence is crucially high. As such, the formulation of a number of postulates and principles for Lamination Mode appears natural and logical.

(iii) Fission asserts to have 19 canons and 18 principles. This is in consonance with the vital role played by Fission in the formation of all Concepts and Subjects. Fissionary relations constitute the base of the structure of concepts and subjects in the dimension of denotation and comprehension. The denotation of a concept needs understanding of its linkages with broader concepts, narrower concepts and related concepts. Moreover, fissionary relations are intrinsic to the concepts and subjects.

(iv) Modes of Fusion, Distillation, Clustering and Agglomeration have so far been identified at the level of Basic Subject only. As such, they are relevant so far in the context of the postulate of Basic Facet stating that "Each subject has a Basic Facet" or "Every subject has a Basic Subject".

The postulate of Basic Facet stands in contradiction with the view of Derek Austin stating that "a system of Main Classes which suits the purpose of library organisation should not therefore be expected to serve as starting point in the design of mechanised citation retrieval

system"¹². Farradane¹³ has also been of the view that there is no need of Basic Subjects. Compound Subjects are to be constructed from the universe of concepts without referring to Basic Subjects.

However, when we consider subject as a system, we are conscious of the fact that no system exists without an environment. Environment establishes the context in which a system functions. In case of subjects, this environment is provided by the Basic subject.

Further, reaction to the concept of Basic Subject was appreciable when, on the one hand, the demarcation among the subjects into fields of specification found helpful and acceptable to scholars were losing their sharpness and new divisions overlapping and criss-crossing the older boundaries were being formed and, on the other hand, the conceptual frame work to recognise new Basic Subjects was missing.

Thanks to Ranganathan and his seminal work at the level of Modes of Formation of Subjects that today we have a conceptual frame-work to recognise new Basic Subjects. The conceptual frame-work provided by Modes of Formation of Subjects, in recognising new Basic Subjects, stands today as follows:

Table 3

<i>Sl. No.</i>	<i>Modes of Formation</i>	<i>Kinds of Basic Subjects</i>
1.	Fission	Traditional Subjects, Canonical Subjects
2.	Fusion	Fused Subject
3.	Distillation	Distilled Subjects
4.	Clustering	Clusters
5.	Lamination	Environmented Basic Subjects, Systems Basic Subjects, Specials Basic Subjects, Compound Basic Subjects.
6.	Agglomeration	Agglomerate Basic Subjects

Moreover, the concept of Basic Subject will continue to remain valid till the practice of referring to scholars and researchers by their field of specialisation is completely done away with. However, the frame-work is not final. It is always challenging use to add new Modes.

(v) Derek Austin¹⁴ traces the source of all correlations in a set of fundamental or primitive relations known as grammatical relations and logical relations. According to him, a relationship must, by definition link at least two concepts, each of which generally assumes

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a different role. His signification of grammatical and logical relations is as follows:

Grammatical Relations

- | | |
|---------------------------|--|
| 1. Predicative (to be) | Links broader, narrower and synonymous concepts |
| 2. Possessive (to have) | Links possessed concepts (part or property) |
| 3. Active (to do) | It can correlate varying number of concepts depending upon the class to which the action itself belongs. |
| 4. Locative (to occur at) | Links located concepts with the environment |

Logical Relations

- | | |
|-----------------------|---------------------------------|
| 1. Coordination (and) | : Links concepts as coordinated |
| 2. Disjunction (or) | : pairs |
| 3. Negation (not) | : |

An analysis of these grammatical and logical relations at seminal level will reveal that the ultimate source of these primitive relations can also be traced in the Modes of Formation of Subjects as shown in the following Table 4.

Table 4

<i>Primitive Relation</i>	<i>Modes of Formation</i>
<i>Grammatical Relations</i>	
Predicative (to be)] Fission
Possessive (to have)	
Active (to do)] Lamination
Locative (to occur at/in)	
<i>Logical Relation</i>] Loose Assemblage

5 CONCLUSION

To conclude, it may be said that the conceptual base of semantic and syntactic relations lies in the Normative Principles identified as Canons of Classification, Postulates for Classification, Principles for Isolate Sequence and Principles for Facet Sequence. Further the source of all these canons, postulates and principles is traceable in the Modes of Formation of Subjects

Lastly, it is a matter of sad reflection that the profession has not paid enough attention to the Ranganathan's model of Modes, Canons,

Postulates and Principles which contain in them wide potentialities of conceptual guidelines for knowledge based systems.

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