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Modes of Formation of Subjects : A Model for Knowledge Representation

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Describes that after the Second World War, the need was realized for developing a theory of the structure of the universe of subjects. Discusses the concept of 'social knowledge'. Describes the criterion for distinguishing different kinds of social knowledge. Enumerates the attributes of a subject. Discusses the concept of mode of formation of subjects. Describes an empirical study carried out by the author to test the model proposed by Dr S R Ranganathan. Concludes that this model is a powerful tool for knowledge representation in information retrieval.

0 INTRODUCTION

In this age of knowledge and information explosion, the basic problem is how to make this magnitude of information available to those who need it. Availability means to remove barriers in the dissemination and transfer of information and to provide right information to the right user in the right way at the right time.

Developments in the tools and techniques from conventional to computerised systems bear a clear testimony to the efforts made to cope up with the problem. In the beginning, the concentration was only on tools and techniques. But gradually and especially after the Second World War, it began to be realised that tools and techniques would not go far without a sound theory. This realisation led the library scientists to go to the heart of the problem of information retrieval. Soon, it was clear that without developing a theory of the structure and development of the universe of knowledge/subjects, real progress was far away. Bliss and Ranganathan stand prominent in this respect.

1 SOCIAL KNOWLEDGE

Knowledge is the totality of ideas conserved by human civilisation. An idea is generated when a knower knows an entity, that is knowee.

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Knowledge is of two types—'personal knowledge' and 'social knowledge'. Social knowledge is the knowledge possessed collectively by the society or social group. It is available freely and equally to all the members of that society through its records. As library and information scientists, our main concern is with social knowledge. The characteristics of social knowledge resemble the concept of "World Three"[1] as given by Karl Popper. 'World Three' of Popper is the world of knowledge or information in the objective sense. It comprises the expressions of scientific, literary and artistic thought codified in libraries and museums, together with all the records of human culture.

2 CONCEPT OF SUBJECT : CRITERION FOR DISTINGUISHING DIFFERENT KINDS OF SOCIAL KNOWLEDGE

Social knowledge is of different kinds. This is based on our experiences in handling documents in libraries. Traditionally, we have been referring them as 'disciplines'. No doubt, the term 'discipline' may distinguish between broad areas of knowledge but its capacity to identify and distinguish all knowledge contained in this context, is 'subject'. According to him, the concept of subject refers to "an organised or systematised body of ideas, whose extension and intension are likely to to fall coherently within the field of interest and comfortably within the intellectual competence and the field of inevitable specialisation of a normal person".[2] In other words, we can define subject as a segment of knowledge whose extension and intension are limited by the interest, intellectual competence and specialisation of a normal person. Applying this concept of subject, we can identify and distinguish all the segments of knowledge in existence and those which will come forth in future. A subject can be either a Basic Subject or Compound Subject or a Complex Subject.

3 STUDY OF SUBJECT AND ITS DIMENSIONS

In a library and information system readers seek information about a subject or its constituents—ideas or concepts. Retrieval and dissemination system has to be designed in such a manner that each reader's requirement for relevant subject/idea/concept could be met efficiently, conveniently and economically. Thus, the concept of subject is basic to library and information services. A study and understanding of the attributes of 'subject' is pre-requisite to the proper design of any retrieval system. The attributes of 'subject' usually considered relevant in such a study are :—

1. Development of a subject and the universe of subjects ; and
2. Structure of a subject and the universe of subjects.

In other words, such a study implies :—

1. Recognition of organised bodies of ideas—that is, subjects that form fields of specialisation of normal Intellectuals ;
2. Studying the modes of development of subjects ;
3. Recognition of the degree of filiation among the fields of specialisation ;
4. Recognition of the types of component ideas of subjects falling in the different fields of specialisation ; and
5. Recognition of the modes of combination and the nature of relation among the component ideas in different subjects.

Development refers to the pattern of growth of the universe of subjects constituting it. Structure implies network of relationships among the elements constituting subjects and the universe of subjects. Developments studies lead to the recognition of structures at different stages in the growth. Structural studies provide an insight into the growth. Structural studies provide an insight into the patterns of relationship.

4 CONCEPT OF MODES OF FORMATION OF SUBJECTS

The concept of Modes of Formation of Subjects is actually a search for the pattern of relationship among the ideas forming constituents of subjects. Ideas combine in a subject statement in numerous ways. There is need to recognise certain patterns at the seminal level. Ranganathan could do it by diving deeper at the near seminal level and reduced the number of combination of ideas to a few patterns. Thus Modes of Formation of subjects represent a typology of relations among ideas constituting subjects.

41 Historical Perspective

Ranganathan started search for a conceptual model of typology of relations around mid 1940s. He was able to identify three modes in 1940s as Denudation, Lamination and Loose Assemblage. Two more modes—Dissection and Suprimposition were added between 1940s and 1967. By the time, Ranganathan started work on the Seventh Edition of the *Colon Classification* he had been able to recognise twelve modes of formation of subjects. They are :—(1) Loose Assemblage 1, (2) Loose Assemblage 2, (3) Loose Assemblage 3, (4) Lamination 1, (5) Lamination 2, (6) Fission (7) Dissection, (8) Denudation, (9) Fusion, (10) Distillation, (11) Subject Bundle/Cluster, and (12) Partial comprehension/Agglomeration. Fission includes Dissection and Denudation.

5 EMPIRICAL STUDY

A study was conducted to put the modelto test by assuming the following null hypotheses :

1. The model is no more valid to analyse and accomodate all subjects.
2. Nature of Basic Subject/Discipline has no impact on the incidence patterns of modes of formation.
3. Variations in the period/year do not make any significant difference in the incidence patterns of modes of formation of subjects.

51 Data Collection and Methodology

The study was confined to macro-documents. Data was collected by scanning the main entries in the Annual Volumes of the BNB for the years 1974 and 1984. Disciplines selected were : Sociology and Biology.

The total number of entries collected were as given in table 1 :

Table 1

Year	*Sociology*	*Biology*	*Total*
1974	950	279	1229
1984	1468	506	1974
Total	2418	785	3203

Subject of each entry, ascertained by the title and subject headings associated with it, was analysed in context of the typology of the Modes of Formation. While determining the mode, Fission was considered only with reference to a Basic Subject and its fission by ACI. Fission at the isolate level was not taken into consideration for the simple reason and logic that all isolates have their origin in fission. In other words, Fission is a relationship at the denotational level of an isolate and is present in the isolate by implication.

52 First Hypothesis

The table 2 presents the analysed data on the incidence of Modes of Formation.

The table clearly reflects upon the capacity of the model to analyse and accomodate all subjects of the sample. As such the null hypothesis stating that "the model is no more valid to analyse and accomodate

TABLE 2

Sl. No.	*Modes of Formation*	*Sociology*		*Biology*		*Total*
		1974	*1984*	*1974*	*1984*	
1.	Loose Assemblage (Complex Subject and Complex Isolate)	215 (22.63)	253 (17.23)	58 (20.78)	137 (27.07)	663
2.	Lamination (Compound Subject and Compound Isolate)	712 (74.34)	1182 (80.51)	183 (65.6)	318 (62.8)	2395
3.	Fission (Basic Subject)	23 (2.43)	33 (2.24)	30 (10.7)	39 (7.7)	125
4.	Fusion			8 (2.9)	12 (2.4)	20
	Total	950	1468	279	506	3203

all subjects" stands rejected. The table also shows that Lamination is the predominant mode of formation followed by Loose Assemblage. In case of Basic Subjects, the incidence of Fission is comparatively higher than Fusion.

53 SECOND HYPOTHESIS

To test the second and third hypotheses, chi-square test was applied. Significance was observed at .05 level. Second hypothesis necessitated to regroup the data for chi-square test, as shown in table 3 :—

TABLE 3

Modes of Formation	*Sociology*		*Biology*		*Total*
	Observed	*Expected*	*Observed*	*Expected*	
1. Loose Assemblage	468	500.51	195	162.49	663
2. Lamination	1894	1808.03	501	586.97	2395
3. Fission	56	94.36	69	30.64	125
4. Fusion	0	15.10	20	4.90	20
Total	2418	2418.00	785	785.00	3203

$x^2 = 150.5475$

d.f. = 3

critical value at .05 level = 7.81473

Since the computed value 150.5475 of chi-square was found far greater than critical value 7.81473, the null hypothesis stating that "the nature of Basic Subject/discipline has no impact on the incidence patterns of Modes of Formation" was rejected. It means that there is a significant relationship between the Basic Subject/discipline and incidence patterns of modes of formation. In other words, incidence patterns of Modes of Formation differ according to the varying nature of different Basic Subjects/disciplines. This phenomenon also directs to the constant need of development and structural studies in different disciplines.

54 Third Hypothesis

Similarly, to test the third hypothesis, data was regrouped as shown in table 4 :—

Table 4

Modes of Formation	*1974*		*1984*		*Total*
	Observed	*Expected*	*Observed*	*Expected*	
1. Loose Assemblage	273	254.40	390	408.60	663
2. Lamination	895	918.97	1500	1476.03	2395
3. Fission	53	47.96	72	77.04	125
4, Fusion	8	7.67	12	12.33	20
Total	1229	1229.00	1974	1974.00	3203

$x^2 = 4.104365$

d.f. = 3

critical value at .05 level = 7.81473

Since the computed value 4.104365 of chi-square was found less than 7.81473, the null hypotheses stating that 'variations in period/year do not make any significant difference in the incidence patterns of Modes of Formation of subjects' was partially accepted, due to the difference being of only one decade between two periods. It necessitated to check the findings according to Basic Subjects. Accordingly, the data was again regrouped according to Basic Subjects as shown in tables 5 and 6 :—

Table 5

Sociology

Modes of Formation	*1974*		*1984*		*Total*
	Observed	*Expected*	*Observed*	*Expected*	
1. Loose Assemblage	215	183.87	253	284.13	468
2. Lamination	712	744.13	1182	1149.87	1894
3. Fission	23	22.00	33	34.00	56
4. Fusion					
Total	950	950.00	1468	1468.00	2418

$x^2 = 11.04109$

d.f. = 3

critical value at .05 level = 7.81473

TABLE 6
BIOLOGY

Modes of Formation	*1974*		*1984*		*Total*
	Observed	*Expected*	*Observed*	*Expected*	
1. Loose Assemblage	58	69.31	137	125.69	195
2. Lamination	183	178.06	318	322.94	501
3. Fission	30	24.52	39	44.48	69
4. Fusion	8	7.11	12	12.89	20
Total	279	279.00	506	506.00	785

$x^2 = 5.1486$

d.f. = 3

critical value at .05 level = 7.81473

It is apparent from the above tables 5 and 6 that the hypothesis stand rejected in case of Sociology, where chi-square value of 11.04109 with 3 degree of freedom, has been found significant at .05 level. On the other hand, Biology shows the acceptance of the hypothesis, as chi-square value of 5.1486 with 3 degree of freedom was not found significant at .05 level.

Thus, it can be derived that the period of a decade, though not very significant, however, has a role to play in the incidence patterns of Modes of Formation in some Basic Subjects. Further, it directs to the need of such studies in various disciplines, both at macro and micro level, spread over a span of 25 years, 50 years, 75 years and 100 years to come to a definite conclusion whether variations in period make any significant difference in the incidence pattern of modes of formation of subjects.

6 CONCLUSION

Lastly, it may be said that Ranganathan model of Modes of Formation of subjects is still a powerful tool for knowledge representation information retrieval. Its incidence pattern differing from basic subject to basic subject impels the library and information scientists to be on constant watch for changes in developmental and structural patterns of different disciplines/basic subjects.

REFERENCES

1 Popper (Karl R). Objective knowledge : An evolutionary approach. 1972. Clarendon Press.

2 Ranganathan (S R). Prolegomena to library classification. 1967. Ed. 3. Asia Publishing House. P 82.