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RESEARCH ON THE STRUCTURE AND DEVELOPMENT OF THE UNIVERSE OF SUBJECTS. (Development of library science. 7).

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The study of the structure and development of the universe of subjects by the librarian is shown to be a a necessary implication of the Five Laws of Library Science. The particular implications of each of the Laws are dealt with. Among the attributes of the universe of subjects to be studied are: Its tendency to become infinite and a continuum; its multidimensional and turbulently dynamic qualities; the emergence and modes of formation of subjects; the frequency and trend of incidence of each of the different modes; the strength of bond among the constituents of a subject; the frequency and pattern of incidence of different kinds of facets; the impact of different kinds of ideas — intuition-based seminal and intellect-based near seminal ones; the use of subjects for different purposes and the rate of such utilisation, at different periods over the last two hundred years; and the effect of the faults of the verbal plane on the idea plane. Other subjects in which the universe of subjects as a whole may be the subject of study from different angles, a syllabus for the subject, and some problems for pursuit, are mentioned.

0 INTRODUCTION

01 Scope of the Paper

The purpose of this paper is

1 To indicate that the study of the 'Structure and development of the universe of subjects' by the librarian is a necessary implication of the Laws of Library Science;

2 To discuss briefly the need for such a study as the basis for the development of the methodology for the design of schemes for classification in particular and for research in library science in general; and

3 To mention the principal subjects that may be covered in the study, and to indicate the subjects for research.

02 TERMINOLOGY

The special terms used in this paper are defined in the following documents:

1 RANGANATHAN (S R). Prolegomena to library classification. Ed 3. 1967.

2 IS:2550-1963. Indian standard glossary of classification terms. 1963.

03 TWO PARAMETERS

Library service is, in essence, the retrieval and dissemination of embodied knowledge to individual members and groups in a community. Therefore, the two essential parameters, the changes in the value of which affect library service are:

1 The universe of readers; and

2 The universe of subjects.

Efficiency of service to readers is to be achieved by the adoption and development of such tools and techniques that would facilitate the classification of subjects embodied in documents, so as to help their retrieval and service to the satisfaction of the Laws of Library Science. To continue to give useful service, library science must keep developing itself to meet the changes in the value of each of the parameters mentioned above. Then alone will library service continue to be a supporting service helping to conserve our resources, particularly intellectual resources, thus enabling the profession to play an intimate and effective role as a partner-in-progress in all sectors of human intellectual activity.

In the succeeding sections we shall consider the concern of library science with one of the parameters — the universe of subjects.

1 LAW 1 OF LIBRARY SCIENCE AND ITS IMPLICATIONS

11 USE OF SUBJECT

"Books are for use" is Law 1 of Library Science. Here, the term "Book" is a generic name to denote all kinds of documents — book, periodical publication, technical report, patent, specification, and non-conventional and meta-documents. The document is a trinity of

1 Soul — embodied knowledge;

2 Subtle body — language and expression of the knowledge; and

3 Gross body — physical body of the document.

The term "use" in the statement of the Law implies essentially the use of organised, expressed and embodied knowledge —

that is, the subject dealt with in documents — by the readers, although the subtle body is indispensable for the acquisition of knowledge and as a vehicle for its communication, and the physical body of the document is a convenient means of transport of the embodied knowledge across pace and through time. A document retrieval system is, therefore, essentially concerned with the classification, search, retrieval, and service of "Subjects". The vagueness in the use of the term "Universe of Knowledge" has recently been clarified by correctly defining the respective terms involved, as follows (17):

111 IDEA

An idea is a result of thinking, reflecting, imagining, etc got by the intellect, by integrating with the aid of logic a selection from the apperception mass and/or what is directly apprehended by intuition and deposited in the memory.

112 KNOWLEDGE

Knowledge is the totality of the ideas conserved by human civilisation — that is, the universe of ideas.

113 SUBJECT

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.

12 CHARACTERISTICS OF SUBJECTS

To satisfy Law 1, the arrangement of documents and the main entries for them should be primarily based on the characteristics of subjects embodied in documents. The study of these characteristics is, therefore, essential for the efficient classification, search, and retrieval of subjects and service to readers.

121 'USE' AS BASIS

A subject may satisfy the inner urge or emotional feelings of an individual or a group of individuals; it may concern itself with the observation or methods of observation of a phenomenon; it may deal with the method of producing a commodity or a service or with their use; or it may describe a situation in society. Therefore, it may be helpful to examine the differences, if any, in the characteristics of the subjects satisfying the respective purposes. Certain affinities and dissimilarities among the subjects will then be recognized.

13 SPIRAL OF SCIENTIFIC METHOD

Subjects used for different purposes show similarities and differences in respect of their emergence and method of cultivation. The use of the Spiral of Scientific Method has been found helpful in the studies on the mode of development of subjects (10) (*See* Fig 1).

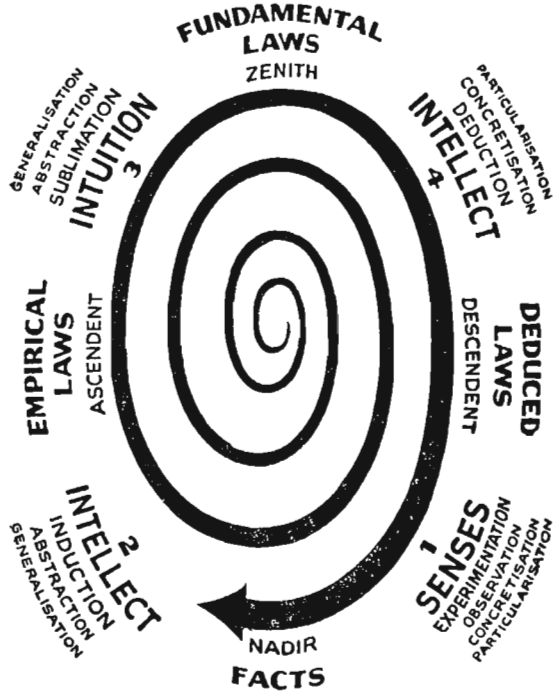

FIG. 1. Spiral of Scienlific Method

The following table gives examples of grouping of subjects with the aid of the Spiral:

SN	Particulars	Examples of Subjects
1	Completed one or more cycles in the Spiral (that is, all the four quadrants)	Physics, Chemistry, Biology, Psychology, Education, History, Political Science, Law.
2	Quadrants 1, 2 and 4 completed and the cycle likely to be completed in due course	Applied sciences such as Engineering, Chemical technology, Animal husbandry, Pharmacognosy, Sociology.
3	Quadrants 3 and 4 alone	Pure mathematics.
4	Quadrants 4 and 1 alone	Speculative disciplines such as Religion and Metaphysics.
5	Quadrant 3 alone	Mysticism, Fine arts and Literature proper.

131 HELPFULNESS OF THE SPIRAL

The helpfulness of the Spiral of Scientific Method may be summarised as follows:

1 It characterises a discipline on the basis of its method of development rather than on the basis of its subject of study or the method used in studying it;

11 The difficulties arising in the traditional method of characterising a discipline as a science on the basis of the subject of study on the method of studying it is bypassed (14).

2 Any discipline may adopt the scientific method in its development.

Thus, the question whether there is a 'Library Science' has been effectively and convincingly answered (15).

3 Certain specific attributes of the different subjects become clear.

31 This is of help to the librarian in learning about certain affinity among large regions of knowledge such as those comprehended by each Basic Subject, Comprehensive Subject, etc.

32. This, in turn, helps in placing these subjects in a helpful position in the universe of subjects.

For example, in CC the Main Classes in the field of Natural Sciences are arranged in the sequence of increasing concreteness. The applied sciences such as Engineering, Chemical technology, Agriculture, Animal husbandry, and Medicine are juxtaposed immediately after their respective essential theoretical subjects.

In the field of Humanities and Social Sciences on the other hand, the Main Classes are arranged in the sequence of increasing artificiality, with Mysticism and Spiritual Experience at one end and Law at the other.

In a DRTC Colloquium, the position of the Main Class Psychology in CC was discussed on the basis of the Spiral of Scientific Method (19).

4 Different models of the development of subjects may be formulated to help the prediction of likely developments in each of the subjects or groups of them.

5 The facility for the prediction of the trend of development in a subject is valuable to the classificationist and classifier in particular and the librarian in general.

2 LAW 2 OF LIBRARY SCIENCE AND ITS IMPLICATIONS

21 Apupa Arrangement

"Every reader his book" is Law 2 of Library Science. Its implication is that the classification and arrangement of the documents and/or the main entries for them should bring together at every point of approach, just those documents relevant to the *interest of the reader at the moment*, and also arrange them on either side in the decreasing degree of affinity. Further, noise — that is, the retrieval of irrelevant documents — should be reduced to a minimum. In order to design and develop a document retrieval system of optimum efficiency the filiation among the subjects as viewed from the angle of the majority—use of the system has to be studied. An 'Apupa Pattern' of arrangement—(A-P-U-P-A = Alien-Penumbral-Umbral-Penumbral-Alien) — of the documents and of the main entries is desirable. An 'Everywhere — Apupa-Pattern' will be ideal to meet the requirements of all readers at all times.

22 Manifold Multi-dimensional Attribute

An attribute of the universe of subjects is that it is manifold multi-dimensional. A clearer definition of this attribute has helped to avoid the confusion caused by designating schemes for classification as uni-dimensional and multi-dimensional schemes.

221 DIMENSION

A Dimension is the degree of manifoldness of a magnitude or aggregate as fixed by the number of parameters necessary and sufficient to distinguish any one of its entities from all others.

222 PARAMETER

A Parameter is an arbitrary constant characterising by each of its particular values, some particular member of a system of expressions, curves, services, functions, etc.

A system is, therefore, one-dimensional if and only if one member of the system can be characterised by the values of one and only one parameter. Similarly, a system is two-dimensional if and only if a member of the system can be characterised by the values of two and only two parameters; and so on. In the context of the classification of the universe of subjects a parameter is a characteristic with reference to which the likeness and the unlikeness of the entities concerned may be determined. Therefore, the dimensions of the universe of subjects is the degree of its manifoldness as fixed by the number of characteristics necessary and sufficient to distinguish any one of its entities from all others. The study of this attribute of the universe of subjects has implications on the design of schemes for classification (*See also* Paper R in this issue).

23 STATISTICAL INVESTIGATION

A reliable basis to draw inferences about the qualities of the universe of subjects may be obtained by extensive statistical investigations on an adequate random sample of macro and micro subjects going with different Basic Subjects. The investigation may cover

1 The number of facets incident in each of the subjects at different periods, separated say, by a generation, particularly since 1800 AD; and

2 The frequency of incidence of different kinds of facets.

Some work has been done at DRTC and the data are being analysed. There is considerable scope for developmental research by a large number of teams, in different subjects.

3 LAW 3 OF LIBRARY SCIENCE AND ITS IMPLICATIONS

31 EXHAUSTIVE RETRIEVAL

"Every book its reader" is Law 3 of Library Science. It implies that at the time of retrieval no document relevant to the interest of the reader at that moment should be missed, irrespective of his approach. Again, a study of the structure and development of the universe of subjects indicates that no single tool of Library Science can fully satisfy this Law. Several of its tools

and methods have to be used concurrently or in succession according to the need to meet the interest of the majority as well as of the minority (11).

4 LAW 4 OF LIBRARY SCIENCE AND ITS IMPLICATIONS

41 Economy

"Save the time of the reader and of the library staff" is Law 4 of Library Science. It implies that

1 The intellectual and mental potential of the reader should be conserved by pinpointed and expeditious retrieval; and

2 The retrieval and service should be done in the most economic manner.

42 Analysis in Depth

To satisfy Law 4 requires

1 Analysis of the universe of subjects to recognise each of its constituents and their relevant characteristics; and

2 Formulation of a methodology for the design and development of a document retrieval system which can implement the findings of the study.

The work done and to be done in this regard including the need for team-research into the possibility of existence of an absolute sequence (syntax) of the constituents of the universe of subjects has been explained elsewhere (13). These fundamental studies are again based on and pertain to the structure of the universe of subjects.

5 LAW 5 OF LIBRARY SCIENCE AND ITS IMPLICATIONS

"The library is a growing organism" is Law 5 of Library Science. This generic statement implies that the universe of subjects is ever-growing, the interests of readers is ever-growing and, therefore, Library Science is ever-growing.

51 Organism

An organism has parts more or less distinct but mutually dependent. It is so structured that the functioning of the parts and their relation to one another are governed by their relation to the whole. The comparison of the universe of subjects to an organism is helpful in the study of the qualities of the former.

52 Growth

The universe of subjects is being cultivated incessantly at many points. This leads to change and growth, and consequently to new structures. There may be an overall increase in size; there may be internal changes including division and fusion of parts, and utilisation and assimilation of elements from the

environment. A historical study of the pattern of development and the structure at different stages in the growth will help to recognise the modes of formation of subjects (*See also* Sec 64).

53 Usefulness of Analogy

The analogy of an organism also gives some hypotheses for the study of the structure and development of the universe of subjects. The following factors about the ecology of an organism may be helpful in this study:

1 The environment of a particular organism at a particular time is not the same as that some distance removed in space and time;

2 Environmental effects observed on an individual cannot be applied without question to the species as a whole;

3 Data obtained in green-house conditions cannot be used for the interpretation of the growth of the same organism in its natural environment; and

4 The vertical as well as horizontal gradients are of greater significance than point measurements of environmental conditions.

The validity and limits of the application of the above hypotheses in the study of the universe of subjects has to be examined both in the practical as well as theoretical levels. Such a study may, at least, indicate the need to have additional or alternative hypotheses. A recent paper (18) has pointed out the limitations of the available means of study.

6 PHYLOGENY AND ONTOGENY OF SUBJECTS

From the discussions in the preceding sections it is evident that a study of the formation, structure, cultivation, and development of the universe of subjects should be an essential equipment of the designer of a document retrieval system.

61 Percepts and Concepts

When the knower comes to know a knowee, knowledge emerges out of this interaction. A study of the process of knowing may, therefore, be helpful to understand the emergence of knowledge. In studying about the content and structure of the universe of subjects it has been found helpful to learn in general about the sequence of events involving the formation of percepts, their association in various ways to form concepts, the association of the latter in various ways to form the apperception mass and further 'polymerisation' through fresh association of concepts to produce subjects; the role of sensory data, intellection, intuitive experience and memory in these events; and the kinds of knowledge resulting from each of the kinds of experiences (*See* Fig. 2).

In these studies the findings in psychology, neurophysiology etc can be drawn upon (*See also* Sec 726).

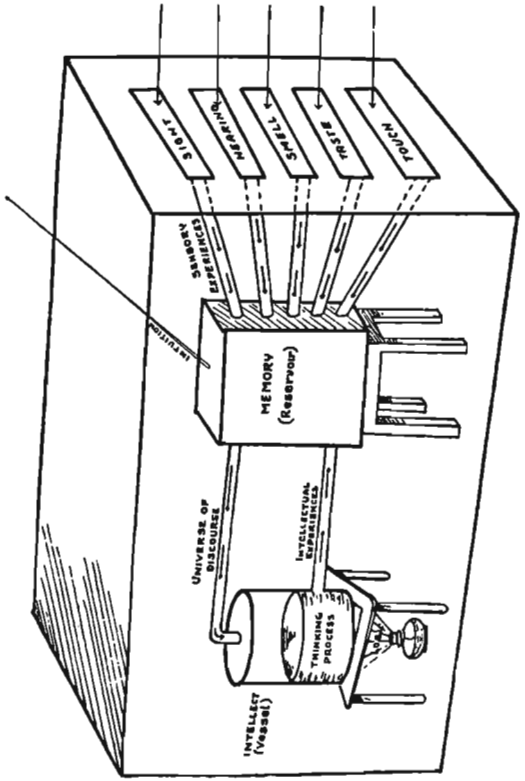

FIG. 2. Brain Chamber (Schematic diagram)

62 CONTINUUM

As a subject develops there may be an increasing degree of interaction — both in intension and in extension — between it and other subjects. This inter-subject interaction has become

quite significant and very much accelerated during the present century. For, more than ever before, there are scholars cultivating the universe of subjects at many points. Further, there are today much better facilities for the quick dissemination and utilisation of new ideas (*See also* Sec 651). Uncultivated and fallow regions in the universe of subjects get filled up quickly making it tend towards becoming a continuum.

63 INFINITE

There is continuous development of the universe of subjects making it tend to become infinite. A new entity may come up at any moment. The extension of the entity may be that of a tiny isolate or it may be as large as that of a Main Subject. Each entity will require to be placed in a filiatory position in the universe of subjects already known.

The classificationist will find it helpful to recognise the implications of the findings in relation to the formulation of an adequate methodology for the development of schemes for classification (*See also* Paper R in this issue).

64 MODES OF FORMATION OF SUBJECTS

In Sec 61 the association among the constituents of the universe of subjects has been mentioned. The study of the modes of such associations helps to grasp the essence of the bond (12) among the constituents. It has been found convenient to make such studies at the near-seminal level avoiding the confusing phenomenal level of innumerable entities claiming Immediate-Neighbourhood-Relations with each other. The modes of formation of subjects that have been recognised are: Dissection, Denudation, Lamination, Quasi-lamination, and Loose Assemblage (16). Partial Comprehension, Subject Bundle, and Bundle of Subjects are met with at the document level.

641 FREQUENCY OF INCIDENCE

It will be helpful to examine the frequency of incidence of these modes in documents on varied subjects produced, say at intervals of a generation, during the last 200 years or so. The objective is to

1 Recognise the trend in the modes of formation of subjects in the different subject fields;

2 Recognise new modes of formation of subjects; and

3 Evaluate the efficiency of document retrieval systems in relation to their ability to helpfully accommodate the different modes of formation of subjects.

A study of this kind was done in a limited way some years ago (7). The implications of the recognition of the modes of

formation of subjects in regard to the methodology for the design of classification schedules are dealt with in Paper R in this issue.

65 IMPACT OF IDEAS

Innumerable ideas are being created every minute. Some of them get embodied in documents. But a study of the history of the development of ideas in different subject fields would indicate that the degree of impact of a new idea on the universe of subjects is not of the same order in all cases. There is the seminal contribution, probably grasped intuitively which makes a powerful, deep and extensive impact, and even turns the course of development of several subjects. It may contribute to a considerable disturbance in the pattern of schedules for these subjects. Then there is the large number of near-seminal contributions, which perhaps constitute the flesh and blood of the document retrieval system. In a study of the mode of development of the universe of subjects it will be helpful to examine the frequency of incidence of the seminal contributions and of the near-seminal and perhaps even of the pedestrian contributions, during the last two or three centuries. Works such as those by Price (4–6) will be helpful in this connection.

Price has suggested that a theory similar to statistical thermodynamics may be helpful in considering the ratio of the total number of papers to the number of 'good' papers and the total number of scientists to 'good' scientists. The basic theory is that all indices in this respect show regular exponential growth, with a doubling every 10 to 15 years. This has been happening in the field of the natural sciences for the last 300 years. Thus the 'size of science' has increased by a factor of 10 with every doubling of the world population. In order to understand the statistical mechanics of exponential and logistic growth of science, Price considered the productivity distribution of scientists. He concluded that the number of people writing 'n' papers in a 'lifetime' is proportional to $1/n^3$.

In the work done in DRTC (1) the frequency of contribution of seminal and near-seminal ideas in the major disciplines in the natural sciences since 1450 AD was considered. The period 1450 to 1960 was divided into three sub-periods: 1450 to 1700, 1701 to 1900, 1901 to 1960. The developments in the years close to the end of each of these periods are significant to library science. Each of the first two sub-periods was further divided into 50-year periods and the third sub-period was divided into two 25-year periods and one 10-year period. The preliminary analysis of the data collected shows that the pattern of the frequency of contribution of seminal and near-seminal ideas differs in the different disciplines considered.

It is the experience that

1 The frequency of disturbance of the rate of development of the universe of subjects is much greater after 1900 than say in mid-nineteenth century. In fact, the universe of subjects has now become turbulently dynamic;

2 The disturbance is frequent in the natural sciences; and

3 The disturbance is becoming appreciable and frequent in the social sciences also.

Quantification of these facts through the use of statistical methods and probably an explanation of the findings on the basis of the cultural state of society, will be useful to the librarian. The findings of such a study have implications in the design of schedule for classification (*See also* Paper R in this issue).

651 PRESSURE FOR DEVELOPMENT

The following table indicates the time lapse between the discovery of a principle and the practical development of the device based on it:

SN	Subject	Year of		N of years between c and d
		Discovery of principle	Practical development of device	
a	b	c	d	e
1	Photography ..	1727	1839	112
2	Telephone ..	1823	1876	53
3	Atomic power release	1932	1945	13
4	Transistor ..	1940	1948	8
5	Laser ..	1958	1960	2

Social pressure in the form of population pressure emphasises the need to increase the production of all kinds of commodities and services to keep the teeming millions going. New methods

of production of commodities and services have to be found out through advances in technology. Advances in technology has to come through applied research. Pragmatic and applied research is to emerge from pure research. Pure research is to be based on fundamental laws. In the present state of the society it has been found more productive to organise research on a team-relay basis rather than on the solo-parallel basis. This has resulted in the creation and utilisation of subjects of various kinds and of various standards at a considerably accelerated rate. The research, production and managerial potential has to be conserved at all levels, in spite of the cascade of the universe of subjects and the varied and changing requirements of readers. Society is now finding it helpful to assign the function of document search, retrieval and service to the library profession rather than detracting for this purpose the research, production, and managerial personnel from their legitimate sphere of work. The library profession has found it necessary to sharpen its tools and techniques and to develop new ones to enable it discharge its responsibility efficiently. This is the purpose of the study of the pattern and rate of development of the universe of subjects.

7 RELATED SUBJECTS OF STUDY

71 VERBAL PLANE

For the absorption and communication of ideas the most widely used medium is language. A precise language is necessary to make the absorption and communication of ideas efficient. Imprecise terminology can even lead to an aberration in thinking. The need for a standard terminology for the different subject fields in order to avoid the faults in the verbal plane and any consequent fallacies in the idea plane is to be emphasised (9). The classificationist has to name the isolates. The terms are to be used in subject headings. Therefore, it has been found helpful to formulate canons for the verbal plane in relation to the terminology used by the specialists in the different subjects.

72 OTHER DISCIPLINES IN WHICH THE 'UNIVERSE OF SUBJECTS' IS A SUBJECT OF STUDY

The principal disciplines in which the universe of subjects as a whole may form the subject of study are:

1 Logic;
2 Epistemology;
3 Metaphysics;
4 Psychology; and
5 Education.

721 LOGIC

It is the systematic study of the general conditions of valid inference. It is the science of reasoning used in the process of

building up the universe of subjects. It does not deal with the structure and development of the universe of subjects.

722 EPISTEMOLOGY

It is that division of Philosophy, whose subject-matter is the study of the methods, the grounds or sources and the validity, including the limits, of the universe of subjects. Epistemology is an aid in the search for knowledge and to understand the nature of knowledge. It does not deal with the structure and development of the universe of subjects.

723 METAPHYSICS

It is the systematic study of the fundamental problems relating to the existence of entities and the reduction of their number to a small number of ultimates. It includes the analysis and synthesis of the experiences of all the fields in the universe of subjects. It does not deal with the structure and development of the universe of subjects.

724 PSYCHOLOGY

Psychology examines the subjective aspect of knowledge, the activity of knowing, as a condition of the individual mind. As a study of the consciousness and behaviour of man, Psychology analyses the question "What is that in man which makes him build up the universe of subjects?" It does not deal with the structure and development of the universe of subjects.

725 EDUCATION

Education, in its broad sense, concerns itself with the development of the capacity in man to build the universe of subjects. It includes all the ways in which one person or group of persons may deliberately influence the behaviour of another person. Behaviour may include knowledge, skill, habit, value, and attitude. It does not deal with the structure and development of the universe of subjects.

726 HELP FROM OTHER DISCIPLINES

From the brief discussion in the preceding sections, it is evident that the various disciplines do not deal with the structure and development of the universe of subjects from the angle required by the librarian but from other angles. However the librarian may find some of the findings in those disciplines helpful in his study of the structure and development of the universe of subjects. For example, modes of association of ideas, as studied by Psychology. Woodrow and Lowell (22), in an analysis of the relative frequencies of word associations, from data collected on

1,000 adults and 1,000 children, have given the following data on the different classes of associations:

Class of association	Relative frequency	
	Adults	Children
Co-ordinate	10·9	6·0
Contrast	10·6	1·3
Similarity	8·9	8·6
Super-ordinate	7·6	3·7
Adjective-noun	6·9	11·2
Verb	6·4	10·2
Contiguity	6·0	15·3
Noun-adjective	4·3	7·3
Cause-effect	2·5	1·9
Whole-part	2·1	3·6
Participles	1·9	0·9
Subordinate	1·6	2·1
Part-whole	1·1	0·4
Material	1·0	0·9
Verb-object	0·9	1·7
Completion	0·77	1·04
Effect-cause	0·4	0·5
Noun-abstract attribute	0·25	0·05
Assonance	0·07	0·43
Pronouns	0·05	0·22
Miscellaneous	4·7	5·5
	78·94	85·84

The various kinds of associations of ideas may give rise to different subjects. Many of the relations have already been taken cognisance of by classificationists and are represented in the schedules of classification and in the synthesised class numbers. It is also noteworthy that the pattern of relative frequency of the different kinds of associations is not the same in the adults and in children.

8 'UNIVERSE OF SUBJECTS' AS A SUBJECT FOR STUDY

80 VALUE OF THE SUBJECT

The value of the study of the 'Structure and development of the universe of subjects' for librarians in general and classificationists and classifiers in particular was sensed in India in 1947. Its value is now being realised in other countries also.

81 INDIA

811 DELHI UNIVERSITY

In 1948, a postgraduate course leading to the Masters Degree in Library Science (M Lib Sc) was instituted in the University of Delhi. One of the subjects for this course was "Universe of Knowledge: Its structure and development". This was probably the first time that this subject was offered in any university course. In any case, it was the first time it formed part of a course for advanced training in Library Science. Dr S R Ranganathan, who framed the syllabus for the Delhi University course, taught the subject there for seven years. After a break of four years from 1955, the teaching of the subject has been resumed in that university in 1959.

812 UNIVERSITY GRANTS COMMISSION RECOMMENDATION

The Review Committee (Library Science) of the University Grants Commission (1957) recommended the subject "Universe of Knowledge: Its development and structure" as a compulsory paper for the M Lib Sc course (20).

813 DOCUMENTATION RESEARCH AND TRAINING CENTRE (BANGALORE) (= DRTC)

The subject is one of the compulsory papers for the Documentation course at DRTC, since the inception of this training programme for documentalists in 1962.

814 INSDOC COURSE

A similar subject is included in the course of training in documentation and reprography in the Insdoc, New Delhi, since 1964.

815 BANARAS HINDU UNIVERSITY

In 1965, the Banaras Hindu University, Varanasi, instituted a course leading to the M Lib Sc. The "Universe of knowledge: Its structure and development" is a compulsory paper for the course.

82 FID'S INTEREST

The subject of the education of documentalists has been engaging the attention of the FID for over 10 years now. As

a step toward drawing up a core curriculum for such a training, Dr Ranganathan framed a syllabus (8). As the very foundation of the training, the subject "Universe of knowledge: Its structure and development" was included in the recommended syllabus.

83 Other Countries

A perusal of Dr Pietsch's compilation (3) does not clearly indicate whether the subject or anything similar to it is offered in the courses for the training in library science (or documentation or information work) in other countries. In one or two centres, however, some aspects of the subject appear to be taught.

831 Recent Interest

In a recent paper Wilson (21) has outlined a post-graduate four-year degree course in information work, the syllabus for which includes the subject "Organisation of Knowledge" in the first and second years. Farradane (2) suggests the 'structure and development of knowledge' as an important subject for research.

D W Langridge has been attempting to teach the subject in the library science course of the North Western Polytechnic in London, and in the University of Maryland, Department of Library and Information Science (Private communication).

84 Syllabus

Given below is an outline of the syllabus for the course "Universe of Subjects: Its structure and development" drawn by Dr Ranganathan and used in the teaching for the M Lib Sc course and in the course on documentation in DRTC. Since it was drawn up almost two decades ago, the contents and the method of teaching the subject has been refined on the basis of experience.

"Universe of subjects: Its structure and development."

1 The various subjects having knowledge as the field of study. Their interrelation.

2 Primary senses. Association. Intellection. Imagination. Intuition.

3 Sensory experience, Intellectual experience. Individual's Externalised and Socialised memory. Thought-Term relation. Nomenclature. Terminology. Fundamental terms and their standardisation.

4 Fact. Empirical law. Descriptive formulation. Fundamental law. Interpretative explanation. Hypothesis. Normative Principle. Deduction. Empirical verification. Abstraction. Generalisation. Concretisation. Particularisation. Spiral of Scientific Method.

5 Positivistic, Speculative and Authority-centred modes of thinking. Methods of pure sciences, applied sciences, social sciences and humanities including fine arts.

6 Universe of subjects as mapped in schemes of library classification. Its demarcation into sections and sub-sections. Universe of subjects as a static continuum.

7 Interrelation of subjects and constituents of subjects. Modes of interrelation and cross-section. Formation of new subjects. Modes of formation. Dissection. Denudation. Lamination. Loose assemblage. Universe of subjects as a dynamic continuum.

91 PROBLEMS FOR PURSUIT

1 Recognising new modes of formation of subjects.

2 Establishing the strength of bond among the constituent isolate ideas in the new modes of formation of subjects.

3 Investigation of the existence of an Absolute Syntax of the facets in a subject.

4 Frequency of incidence of the different kinds of facets in subjects going with different Basic Subjects.

5 Frequency of incidence of the different modes of formation of subjects at different periods during last two centuries.

6 The optimum of depth of analysis of the universe of subjects in the context of the requirements of particular groups of specialist readers.

7 The extent of loss of details, if any, in the generalisation and abstraction as one goes nearer the seminal level.

8 Methods of control of the loss of details, if any, in the higher levels of abstraction.

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