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Digital Library of Information Science & Technology

Chapter 4

SUBJECT HEADING AND FACET ANALYSIS*

S.R. RANGANATHAN

After establishing the terminology, shows how the choice of the name of the subject of a document and the rendering of the name in the heading of the specific subject entry can be got by facet analysis based on postulates and principles. After showing that subject headings constitute an artificial language, points out that using facet analysis for subject heading does not amount to using class number. Marks out the area for an objective statistical survey of sought heading for subject entry. Calls on Council for Library Resources Incorporated to provide for this project.

1 TERMINOLOGY

1.1 Subject

Thought-content of a document.

1.2 Basic Subject

Assumed term. It is usually of a large extension. It is capable of being sub-divided on the basis of one or more trains of characteristics. It admits of a book on it being written by a single author and being sought

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* Abbreviations used: BTI=British Technology Index (1962); CCC=Classified Catalogue Code with additional rules for dictionary catalogue code (1958) by S.R. Ranganathan; Cutter=Rules for a dictionary catalogue (1904) by C.A. Cutter; Elements=Elements of library classification (1962) by S.R. Ranganathan; Prolegomena=Prolegomena to library classification (1957) by S.R. Ranganathan.

for its entire contents by an appreciable number of general readers or even of specialist ones. There is no unique list of Basic Subjects. Each School of Cataloguing may put up its own list – in other words, *postulate* the list. It may include a few hundreds of Basic Subjects. It is desirable not to include in the list a subject capable of separation into a Basic Subject and an Isolate.

1.3 Isolate

Assumed term. In a sense, it is not a subject by itself. But if it is attached to an appropriate basic subject, the result is a subject of smaller extension. For example, 'Gold' is an isolate.

Ch emistry of Gold,	Gold Smithy,
Metallurgy of Gold,	Gold Sculpture, and
Economic Geology of Gold,	Gold Currency
Mining of Gold,	

are different subjects derived by attaching the isolate 'Gold' to different basic subjects. A number of isolates also may be attached to one and the same subject.

Prospecting for Gold,
Prospecting for Gold in India, and
Prospecting for Gold in India in 1964,

are all subjects derived from the basic subject 'Economic Geology' by attaching the isolate 'Gold' and some other isolates to it. A book embodying every possible subject derivable by attaching the isolate 'Gold' to every possible basic subject cannot obviously be written by a

specialist in a single subject. It is likely to be only a Composite Book, consisting of several contributions by different specialists. And readers for the whole of such a book will be few. It is in this sense that an Isolate cannot be a Subject by itself.

1.4 Facet

A generic term for 'Basic Subject' and 'Isolate'.

1.4.1 Focus

A generic term for 'Subject', 'Basic Subject', and 'Isolate'. It may be distinguished as Overall Focus, Basic Focus, and Isolate Focus. In the Verbal Plane, the two latter may be denoted by the terms 'Basic Term' and 'Isolate Term' respectively. We may also speak of the Constituent Facets of a Subject.

1.4.2 Kernel

A constituent facet – that is, the Basic Subject or an Isolate of a subject.

1.4.3 Kernel Term

The term denoting a kernel in a subject.

1.5 Facet Analysis

Recognizing the Basic Subject and each of the Isolates of a subject, and arranging them in a preferred sequence in accordance with prescribed rules.

1.6   Scheme of Classes

A scheme for the arrangement of subjects in a helpful sequence.

Chapter 7.1 of the Prolegomena mentions nine well-known Schemes of Classes.

1.6.1   Scheme of Classification.

The classes in a scheme of classes — each provided with its class number — arranged according to the class numbers representing the respective classes.

Chapter 7.2 to 7.8 of the Prolegomena mention seven Schemes of Classification.

1.6.2   Classifying

Assigning a subject to its class in a preferred Scheme of Classification and determining its class Number.

1.7   Main Entry

The one entry of a document in a catalogue, giving maximum information about it.

1.7.1   Book Index Entry

An entry, other than the Main Entry, mentioning a document in a brief way.

1.7.2 Specific Subject Entry

A Book Index Entry with the name of the specific subject of a document in its Leading Section.

1.7.3 See also Subject Entry

A general Index entry referring from the name of one subject to that of another.

1.7.4 Heading

The occupant of the Leading Section of an entry.

1.8 Annotation on Facet Analysis

1.8.1 Idea and Verbal Planes Only

Face t analysis is work done in the Idea Plane and in the Verbal Plane. It does not involve any work in the Notational Plane. In fact it does not require any notational system. It does not depend on any Scheme of Classification.

1.8.2 A Misconception about Facet Analysis

Some current writings disclose a misconception about Facet Analysis. They seem to imply the belief that Facet Analysis is either by itself Classification or that it is a technique designed exclusively for Classification. At any rate, Facet Analysis and Classification are taken to be inseperable. This is not correct.

1.8.3 Three Uses of Facet Analysis

On the other hand, Facet Analysis can be used for three different purposes, *viz.,*

1. Determination of Class Number;
2. Reference Service; and
3. Determination of Subject Heading.

Basing classifying work on Facet Analysis is now well-known. In reference service, the requirement of a reader — particularly of a specialist reader — at the moment is formulated pin-pointedly and expeditiously by Facet Analysis — that is, by ascertaining, through a careful conversation, the Facets of his requirement and the exact Focus in the Basic and each of the Isolate Facets respectively. The determination of the subject of a document and its subject heading has been a matter of flair all along. But it can be made in a systematic and standard way with the aid of Facet Analysis.

2 SPECIFIC SUBJECT

2.1 Choice of Heading

It is now accepted without question that any catalogue or documentation list should give a Specific Subject Entry to each document. Whether the name of the subject is made of words in a natural language (as in Dictionary Catalogue), or of the digits of an ordinal language (as in Classified Catalogue), the Subject has first to be ascertained in precise terms. In other words, the Choice of the Name

of the Specific Subject is the first step. It is desirable to base this on a Standard Procedure.

2.2 Rendering of the Heading

If the name of the subject is a single-worded term, there is no further problem. By single-worded term is meant a word comprehending each and every facet of the subject. Hardly any natural language has such a single worded comprehensive term to denote the majority of the myriads of multi-faceted subjects attracting documents today. In general, a subject has to be denoted by a multi-worded term. When put on the Leading Section of the Subject Entry, this multi-worded term becomes a Multiple Heading.

2.3 Problem of Multiple Heading

The core of the problem of multiple-heading is the sequence in which the heading — made of each of the different words or word groups is the multi-worded name of the subject — should be written in the Leading Section of the Specific Subject Entry. To take a particular example, a multiple-heading — of, say, five constituents — would admit of 120 different sequences. To give a Book Index Entry for the document under each of these 120 sequences would make the catalogue an octopus, apart from the prohibitive cost. We have therefore to select a single sequence as the Standard Rendering. At best, we may allow a small number of *See also* Subject Entries to direct attention to the entry with the Standard Rendering out of the many possible renderings and the selection of the necessary and sufficient minimum number of *See also* Subject Entries forms the core of the problem of Multiple Subject

Heading. This has always been left to the flair of the cataloguer. Occasionally, he has been helped by the flair of the author of a Dictionary of Subject Headings. We say 'occasionally' because documents embodying many new multi-faceted subjects, not covered by such dictionaries, are coming out today at a rapid rate. Therefore, flair and dictionary should be replaced by a Standard Procedure. It will be convenient if one and the same Standard Procedure is sufficient for the Choice as well as the Rendering of the Specific Subject Heading.

3   PROCEDURE OF FACET ANALYSIS BASED ON POSTULATES AND PRINCIPLES

The protean, unpredictable ways of formation of multi-faceted subjects would indicate the helpfulness of basing the determination of all the relevant kernels of a subject, and of the standard rendering of the Kernel Terms, on a set of Postulates for Facet Analysis, and Principles for Facet Sequence. By varying the postulates and the principles, we may get different procedures. One set of postulates and principles has been hit upon by the Indian School of Thought. Perhaps this is the first of its kind. More powerful or sharper standard procedures may be hit upon in future. Till then, the standard procedure based on Facet Analysis and illustrated in the next section and its subsections can liberate us to some extent from the present predicament of leaving decisions about Subject Headings of micro-documents to the individual cataloguer in a 'do your own best' kind of situation, without sufficient guidance being given to him in the form of a standard procedure.

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4 STANDARD PROCEDURE FOR THE CHOICE OF THE SPECIFIC SUBJECT

The standard procedure evolved in chapters H, J, K, and N of the *Elements* will now be demonstrated by determining the kernel terms needed in choosing and specifying the name of the subject of the following document and the rendering of its name in the Heading.

> Jones (D M) and Noone (T M). Some approaches to the permanent flame-proofing of cotton: Systems containing phosphorus (J. ap. Chem. 12; 1962; 349-405).
>
> This entry is based on *BTI*, 1962;275.

The standard procedure has four steps yielding successively the Full Title, the Kernel Title, the Analysed Title, and the Transformed Title respectively of a document.

4.1 *Step 1*: Full Title

The Full Title is derived from the Raw Title found in the document by filling up all the ellipses in it and breaking down each composite term into its fundamental constituent elements. Usually the Basic Facet would be absent and will have to be filled up. Here it is 'Fabrics'. For, according to the Postulate of Basic Facet, every subject has a Basic Facet (*See* Sec H1.1 of the *Elements*). The concept of 'fundamental constituent terms' is still left to flair based on experience. We have yet to find the semantic depth to which the breaking down should be carried. Sometimes, the whole document may have to be glanced through in this process. In the document under consideration, there is no composite word to be broken down. But the following terms are to be supplied to

fill up ellipses: Fabrics and Finishing. The Full Title of the document is then

> Some approaches to the permanent flame-proofing in the finishing of cotton fabrics: Systems containing phosphorus.

4.2 *Step 2*: Kernel Title

The Kernel Title is derived from the Full Title by removing all the auxiliary terms and puffs and replacing all the surviving essential terms in their respective nominative forms. The Kernel Title of the document is then Flame-Proof. Finishing, Cotton, Fabrics Phosphorus.

4.3 *Step 3 :* Analysed Title

This step is convenient, but not essential. Step 3 and Step 4 may be merged into a single step. Step 3 is illustrated in what follows. The Kernel Term 'Finishing' is first spotted as denoting the Energy Facet of the subject. Then, the position of each facet other than the Basic Facet, is determined one by one, relative to the Energy Facet. This is done with the aid of the Wall-Picture Principle, which is, 'if two facets A and B of a subject are such that the concept behind B will not be operative unless the concept behind A is conceded, even as a mural picture is not possible unless the wall exists to draw upon, then the facet A should precede the facet B'. (*See* Sec N 3.2 of the *Elements.*)

As between the concepts of 'Cotton' and 'Finishing', the latter concept does not become operative (will not be thought of), unless the

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latter concept is conceded (had been already thought of). Therefore 'Phosphorus' succeeds 'Finishing'.

As between the concepts of 'Flame-Proof' and 'Finishing', the former concept does not become operative (will not arise) unless the latter concept is conceded. Therefore, 'Phosphorus' succeeds 'Flame-Proof'.

4.4 Step 4: Transformed Title

Thus the following Transformed Title of the Document is derived from the Kernel Title:

Fabrics. Cotton. Finishing. Flame-Proof. Phosphorus.

We have now completed the Choice of the Name of the Specific Subject of the document. This name is a term with five words should be used to satisfy the Canon of Individualization. (*See* Sec. 0.2.3 of *CCC.*)

5   RENDERING OF NAME OF THE SPECIFIC SUBJECT IN HEADING

Then comes the rendering of the multi-worded name of the subject chosen for the Heading. As already stated in Sec 2.2, there are 120 possible arrangements of the five words in the name. Therefore, there are 120 ways of rendering the name of the specific subject. We have to choose one and only one of them. For convenience of reference, let

us call the sequence arrived at in Sec 4.4 the 'Forward Rendering'. An obvious alternative is the reverse one:

Phosphorus. Flame-Proof. Finishing. Cotton. Fabrics.

Let us call this 'Reverse Rendering'.

5.1   Choice of First Heading

Let us first concentrate on the first heading. Only five first headings are possible. In the Forward Rendering, the first heading is 'Fabrics'. In the Reverse Rendering, the first heading is 'Phosphorus'. We can also have three other first headings, *viz.* 'Cotton', 'Finishing', 'Flame-Proof'. The first problem is the choice of one of these words for the first heading. This we can determine on the basis of one or other of two of the Canons of Cataloguing given in *CCC*.

5.1.1   Canon of Prepotence

The Canon of Prepotence is 'The Principle:

1. that the Potency to decide the position of an entry among the various entries in a catalogue should, if possible, be concentrated totally in the Leading Section;

2. that it should be concentrated, as much as possible, in the entry element; and further

3. that, if total concentration in the Leading Section is not possible, the minimum possible potency should be allowed to overflow beyond it to later sections'. (*See* Sec. 0.2.20 of *CCC*.)

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The following table gives the potency of each of the five first headings, as based on the *BTI*.

First Heading	Number of Entries	Potency
Fabrics	200	1/200
Cotton	37	1/37
Finishing	71	1/71
Flame-Proof	2	1/2
Phosphorus	8	1/8

Left to itself the Canon of Prepotence will therefore choose 'Flame-Proof' as the first heading. If the reader should be helped to have the least number of entries to be looked into in order to spot out his documents, 'Flame-Proof' will have the greatest claim to be the first heading of the specific subject entry of the document; and 'Fabrics' will have the least claim.

5.1.2 Canon of Sought-Heading

But we should consult also the Canon of Sought Heading. (*See* Sec 0.2.40 of *CCC*). This Canon will determine the first heading in the light of the answer to the question 'Are the majority of the readers likely to look for the document under "Fabrics", or under "Cotton", or under "Finishing", or under "Flame-Proof", or under "Phosphorus" as the first heading? What is the relative frequency of each of these terms being sought as the first heading'.

5.1.3 Statistical Survey or Opinion

The answer, to these questions, can be based on an objective statistical survey or on conjecture based on experience. The former basis is not available. Conjecture is the only recourse. In reality it degenerates into opinion. Here comes the apple of discord.

5.1.4 Only Two Schools of Thought

At present there are only two dominant Schools of Thought – one choosing the first heading as in the Forward Rendering, and the other choosing the first heading as in the Reverse Rendering. *BTI* prefers the Forward Rendering. The School of Specific Subject Heading prefers the Reverse Rendering. The dispute between these two Schools of Thought should be decided either by a statistical study or by casting lots. Otherwise, to carry on the discussion on this issue will amount only to an indulgence in polemic. The polemic may have really to range not only over these two Schools of Thought; but it can also range over any number from five to 120 Schools of Thought if the name of the subject has five kernel terms, and if the choice of the second and the later headings also are to be open to all possible variations.

5.1.5 Omission of First Term

Can we omit the first or the first few kernel terms? In the case of the Reverse Rendering, the First Term should never be omitted. In the case of the Forward Rendering, the answer to the question will depend upon whether the library or the documentation list is for the generalist reader or for the specialist reader in the subject field 'Fabrics' or in the subject field 'Cotton Fabrics'. If it be a documentation list prepared on

'Cotton Fabrics', the two headings 'Fabrics' and 'Cotton' need not be used at all. If it be a documentation list on 'Fabrics', the heading 'Fabrics' need not be used at all. On the other hand, if it is a general documentation list such as the BTI, the first heading should be 'Fabrics'.

5.2 Omission of Last Term

In the case of the Forward Rendering, the last term should never be omitted. In the case of the Reverse Rendering, it may be possible to omit the last one or more terms in certain contexts. Strict rules for this have not yet been provided.

5.3 Omission of Intermediate Term

With only a limited number of documents, it may look as if some of the intermediate terms might be dropped. For example, in the subject under consideration, it may look as if the heading 'Finishing' might be droppped whether the Forward Rendering or the Reverse Rendering is adopted. But one has to beware of the Fifth Law of Library Science. For in that case, any day two different documents may appear with the same Specific Subject Heading but embodying two different subjects. The only way of distinguishing them will then be the restoration of the missing link 'Finishing' in one case and some other term in the other.

6 CHAIN PROCEDURE

Once the choice and rendering of the Specific Subject Heading of a document is established on the basis of the preferred set of Postulates for Facet Analysis and of Principles for Facet Sequence, the necessary

and sufficient minimum number of *See also* Subject Headings are derived from the Specific Subject Heading mechanically with the aid of Chain Procedure. (*See* Part 3 of *CCC*).

6.1   Headings for *See also* Subject Entries

Whether we use the Forward Rendering or the Reverse Rendering, the necessary and sufficient minimum number of *See also* entries is four for the document considered. In the case of the Reverse Rendering, these headings will be:

1. Flame-Proof, Finishhing, Cotton, Fabrics;

2. Finishing, Cotton, Fabrics;

3. Cotton, Fabrics; and

4. Fabrics.

These entries will help the minorities of readers seeking the document in question through a first heading other than 'Phosphorus'. In the case of the Forward Rendering, the headings for the four *See also* entries will be:

1. Cotton. Fabrics;

2. Finishing. Cotton. Fabrics;

3. Flame-proof. Finishing. Cotton. Fabrics; and

4. Phosphorus. Flame-proof. Finishing. Cotton. Fabrics.

These entries will help the minorities of readers seeking the document in question through a first heading other than 'Fabrics'.

6.2   Versatility of Chain Procedure

The Rules of Chain Procedure can be so framed as to implement any kind of decision about Sought First Heading and the other successive headings in conformity with the Principle of Local Variation (*See* Sec. 0.3.5 of *CCC*).

6.3   Common Practice

For example, in some catalogues and documentation lists, the Common Isolate Terms — denoting either Approach Material, or Common Personality or Common Energy Isolates, or Property, or Geographical Area, or Year – occurring last in the Forward Rendering are usually disqualified from eligibility to be First Heading either in a Specific Subject Entry or in a *See also* Subject Entry. For example, consider a document which embodies the Bibliography of the document we have considered so far. Even in the Reverse Rendering, the Heading of the Specific Subject Entry will be only Phosphorus. Flame-Proof. Finishing. Cotton. Fabrics. Bibliography; and not Bibliography. Phosphorus. Flame-Proof. Finishing. Cotton. Fabrics.

There will not be even a *See also* Subject Entry with the latter heading. *See also* Subject Entry with Bibliography as the First Heading will not be given, even if the Forward Rendering is used for the Specific Subject Entry.

6.4   Special Practice

On the other hand, it may be useful to make each of the common isolate terms eligible in certain kinds of documentation list and even in the catalogue of a library such as the one specializing in regional studies. *My Union catalogue of learned periodicals in South-East Asia* follows this practice for special reasons.

6.5   Decision in the Idea Plane

Whatever it be, the decision should first be made in the Idea Plane. Then, the Rules of Chain Procedure can be framed so as to implement in the Verbal Plane, the policy adopted in the Idea Plane.

7   ARTIFICIAL LANGUAGE

7.1   Artificial Syntax

The headings of subject entries taken together form an artificial language. No doubt the words used are taken from a natural language. But the syntax is one of position and is different from the syntax of the natural language from which the words are taken. It is well known that syntax varies from one natural language to another. Formal linguistics and psychology do not appear to have as yet discovered the natural syntax − 'Patterns of linguistic thought and expression' − independent of the natural language used. Therefore, the sequence of the words in a multiple subject heading − that is, the syntax of the artificial language of subject headings − is not yet known to be unique. But all the same we have to evolve a consistent syntax for it. The Postulates of Facet

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Analysis and the Principles for Facet Sequence yield one possible syntax – that is, for the arranggement of the words in a heading and the meaning depending on it.

7.2 Punctuation Mark

The symbols such as "," and "." inserted between the successive headings in a multiple subject heading belong to the artificial language and their function and purpose are determined by the rules of that language. It is for this reason that *CCC* has some special rules on punctuation marks. To pick up the thought embodied in a language – natural or artificial – it is not always necessary to be thoroughly well-versed in every detail in the grammar of the language. The very subject-context helps one to follow the expression and the thought conveyed by it.

8 REFLECTION

8.1 Wrong Assumption

The Postulates for Facet Analysis and the Principles for Facet Sequence are of as much help in finding out the names of the Specific Subject of a document and in rendering it in the Subject Heading, as they are in establishing its Class Number. The tasks of cataloguing and of classifying are equal beneficiaries of these postulates and principles. The use of one and the same procedure in cataloguing and in classifying does not warrant the assumption of subject heading being derived from class number or of class number being derived from subject heading.

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Of two different branches A and B of one and the same tree, we do not say either that A stems from B or that B stems from A.

8.2 The Outstanding Problem and its Difficulties

The School of Specific Subject Heading would trace its origin to Cutter. The commentaries on Sec 1.6.1, 1.7.4, 1.7.5 of Cutter are as penetrating and forward looking as the commentaries on most of its other sections. Cutter was finalized in 1891. In that distant age, Cutter contemplates only books of that day and neither the multifaceted books nor the micro-documents of today. Even so, the choice of the name of the subject of a book was nebulous. Its rendering was equally so. No definite procedure was possible. Now, we are in a better position. The only task to be done is the Statistical Survey of the reader's approach to the First Heading as well as the sequence of the other headings in a multiple subject heading. This survey is not easy. For it will have to reckon, not with a freely thinking population, but with one mentally conditioned by the cataloguing practices – good or bad – to which they had been all along exposed. The Survey Project should devise methods to get behind such mental conditioning.

8.3 An Appeal

My appeal goes to the Council for Library Resources Incorporated. It has monetary resources. Its Head is keen to pursue such difficult statistical projects. I know that Verner Clapp has already dealt with several problems. Some of them had arisen out of our mutual contact. I commend this Statistical Project on Multiple Subject Headings to his fostering care.

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