CHAPTER J

STRUCTURES OF DEWEY'S SIL

1 INTRODUCTION

A detailed study on Dewey's Language of Decimal Classification complemented by his Language of Relative Indexing has been carried out (9). The findings of that analysis that are directly relevant for the purpose of logical interpretation of the General Theory of SIL are synthesized in this chapter.

2 DEVELOPMENTS OF SILS PRIOR TO DEWEY

Consider a catalogue or index in which the entries are arranged under verbal subject-propositions in the following sequence:

Mathematics
Physics
Engineering
Chemistry
Chemical technology
Geology
Mining
Biology
Botany
Agriculture
Zoology
Animal husbandry
Medicine

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The arrangement of the verbal subject-propositions is systematic; and it is based on certain logic. A catalogue or index of this type used to be called a Classed Catalogue.

The inefficiency of such an arrangement as a finding tool is obvious. To reduce its inherent inefficiency, at the initial stage, it was supplemented by an alphabetical author, title, and catch word of the title index. As a result, in the majority of cases, the systematic part remained unused; and therefore ineffective. To reduce its ineffectiveness, an additional supplement in the form of an alphabetical subject index was introduced in the form shown below:

Agriculture
Animal husbandry
Biology
Botany
Chemical technology
Chemistry
Engineering
Geology
Mathematics
Medicine
Mining
Physics
Zoology

= 197 =
In the context of such an alphabetical subject index, the systematic part became completely useless as a finding tool. The consultation of the systematic part was not at all necessary for any purpose that normally prompts the consultation of a catalogue or index.

Gradually, experience showed that the alphabetical subject index to the verbally systematic part of the classed catalogue was, by itself, self-sufficient. The result of this realization was the Alphabetico-Classed Catalogue. In fact, the alphabetical subject index to the verbally systematic part of the classed catalogue was, by itself, an alphabetico-classed catalogue. However, attention was turned towards the development of the alphabetico-classed catalogue.

But, a second criticism, which had been in existence against the classed catalogue was the inadequacy of the predesigned scheme for verbal classification, which formed the basis of the systematic part of the catalogue. A classed catalogue based on such a scheme failed to respond to "specific subject queries". Attempts were made to meet up this inadequacy by extending the scheme as far as practicable. But the policy of indexing did not allow the crossing of the
limitation of the scheme for verbal classification. As a result, "individual subjects" and many "general subjects" of comparatively greater intension could not find a place in a classed catalogue of the type mentioned above. The new development in the form of alphabetico-classed catalogue continued to suffer from the inadequacy of the predesigned scheme for verbal classification.

The Dictionary Catalogue developed as a challenge to classed catalogues, with special intention to respond to "specific subject queries. It rejected, at the initial stage, the predesigned scheme for verbal classification. Cutter was the first to realize its value even in relation to a dictionary catalogue. Cutter's contributions towards the development of the dictionary catalogue has been discussed in Chapter I.

3 DEWEY'S CONTRIBUTION

At this stage of development, Dewey entered into the field of SIL. He examined thoroughly the criticisms against the so-called "Classed Catalogue". He found that the criticisms were not against the "systematics" of the classed catalogue; but they were against the inadequacy of the schemes for verbal classification; and the way they were used in designing catalogues or
indexes. He was convinced that one scheme could be an alternative to another; but, what could be achieved by a scheme could not be achieved without a scheme.

Dewey's findings can be summarized as follows:

(1) The schemes for classification used for designing classed catalogues were all schemes for verbal classification. The difficulty with such schemes was that there was no mechanical way of deciding and funding the position of a subject in the systematic part of the catalogue.

(2) The schemes were not adequately developed to take care of many subjects of comparatively greater intension, especially those which Cutter called "individual subjects" on which there were considerable literary warrant, at that time; and also the compound subjects.

(3) There was no scientific procedure to derive subject-propositions, especially, the specific compound subject-propositions for designing the alphabetical part of the classed catalogue.

All his findings made him search for solutions to these problems. And ultimately, he came out with a great success. This success consists of the following:

= 200 =
(1) His scheme for classification called the Decimal Classification fitted with decimal fraction notations to mechanize the decided arrangement of classes. It may be noted here that Dewey first introduced the decimal fraction notation in the second edition of his Decimal Classification.

(2) His system of alphabetical indexing called the Relative Indexing for deriving verbal subject-propositions from the class numbers. He constructed the alphabetical index to his scheme by following this system of indexing and called it the Relative Index. The relative index could facilitate the finding of the class number for a specific subject; and the recognition of its relationships with other related subjects.

This was, indeed, a remarkable contribution towards the development of SIDs. Besides this, another remarkable contribution of Dewey was the concept of a new type of classed catalogue, which he called by the same name, but which has been called by Ranganathan as the "Classified Catalogue". It consisted of the following parts:

(1) A systematic part arranged by class numbers; and
(2) An alphabetical part providing class numbers for different subjects — simple, compound, and complex.

Dewey is the author of the first Classified Catalog Code (6, 34, 35, 36).

The information furnished above is essential to understand the principles underlying the design of the different structural components of DC.

4 SURFACE STRUCTURE OF DC LANGUAGE

Dewey did not mention any explicit postulates about the structures of compound subject-propositions. But some of his basic postulates are readily discernable from the structures of class numbers of subjects in the fields of Medicine and Agriculture (31, 32, 33). For this purpose let us take note of the structures of the following subject propositions in terms of elements and modifiers.

Note.— D = Discipline. E = Entity. A = Action. P = Property. m = Modifier

<table>
<thead>
<tr>
<th>Class Number</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>610</td>
<td>Medicine = D</td>
</tr>
<tr>
<td>611</td>
<td>Medicine; Anatomy = D;P</td>
</tr>
<tr>
<td>611.1</td>
<td>Medicine; Anatomy - Cardiovascular organs = D;P;m =</td>
</tr>
</tbody>
</table>

= 202 =
611.12 = Medicine; Anatomy - Cardiovascular organs - Heart = D;P-m
612 = Medicine: Physiology = D:A (Self)
612.1 = Medicine: Physiology - Blood circulation (Cardiovascular system) = D:A-m
612.17 = Medicine: Physiology - Cardiovascular system - Heart = D:A-m
616 = Medicine; Diseases = D;P
616.1 = Medicine; Diseases - Cardiovascular system = D;P-m
616.12 = Medicine; Diseases - Cardiovascular system - Heart = D;P-m

630 = Agriculture = D

Prerequisites for practice (E = Entities)
631 = Agriculture, Farm = D,E
631.2 = Agriculture, Farm, Farm buildings = D,E
631.3 = Agriculture, Farm, Farm machinery = D,E
631.35 = Agriculture, Farm, Farm machinery - Harvesting = D,E-m
631.358 = Agriculture, Farm, Farm machinery - Harvesting - Special crops = D,E-m
631.3586 = Agriculture, Farm, Farm machinery - Harvesting - Special crops - Sugarcane = D,E-m
631.4 = Agriculture, Soil = D,E

Operations (A = Actions)
631.5 = Agriculture : Farm operations = D : A
631.51 = Agriculture : Farm operations : Soil preparation = D : A

= 203 =
Crop diseases (P = Properties)

632 = Agriculture; Hindrances = D;P

Crops (E = Entities)

633 = Agriculture, Field crops = D,E
633.1 = Agriculture, Field crops, Cereals = D,E
633.11 = Agriculture, Field crops, Cereals, Wheat = D,E
633.115 = Agriculture, Field crops, Cereals, Wheat; Harvesting = D,E:A
633.11911 = Agriculture, Field crops, Cereals, Wheat; Injuries from low temperature = D,E:P

The above analysis in terms of elements and modifiers, admits of the logical abstraction of a surface structure as follows:

Base = Discipline
Care = Entity/Action/Property

Any one of the elementary categories are amenable to modification. A modifier can be based on any one of the categories.
Dewey's recognition of Form, Place, and Time (Historical periods) as Common Modifiers is well-known.

This surface structure can be represented as follows:

\[
\begin{array}{c}
D-m \\
\mid \\
D, E-m \\
\mid \\
\mid -m \text{ (Common)} \\
D; A-m \\
\mid \\
D; P-m \\
\end{array}
\]

Obviously, this model of surface structure has emerged from the source deep structure through the decisions about the Base, and the Core.

It may be noted here that up to the 12th edition of DC, its structure for organizing classification conformed totally to the surface structure given above. The 12th edition of DC (31) was published in 1927. And it is well known that the revision work for 12th edition of DC was completely carried out under the direct supervision of Dewey.

The 13th edition of DC was published in 1932—that is, after his death, in 1931. The revision work for this edition also, was to a large extent supervised by Dewey. A notable feature was introduced in DC in its 13th edition (32). Consider the following two examples to take note of this feature:
These examples show that the surface structure of DC admits of a structure like

\[ D, E; A \] or \[ D, E; P \]

especially when \( A \) or \( P \) pertains to \( E \). This feature was absent from DC up to its 12th edition. This structure is in complete agreement with the Basic Sequence derived from the deep structure of SIL. This new feature has been continued and developed considerably in the later editions of DC(33). This feature seems to have influenced later developments in the field of organizing classification. In CC, this feature has been predominant from the very beginning.

Additionally again, the treatment of \( E \), \( A \), and \( P \) simultaneously as the Core for the general treatment of their manifestations is, indeed, significant from the point of view of purpose-orientation.
Dewey called the index to the DC Schedules as the Relative Index. Potentially, a schedule entry is a subject-proposition for a subject embodied in a document. In this sense, the Relative Index is potentially a subject index for documents, through not for a particular set of documents. The nature of the Relative Index is so general that it can be helpfully used as a substitute for a collection in a library by introducing some suitable methods of adoption and adaptation. As an alternative, it can be used as a guide to construct a subject index for a document collection in a library. Dewey has recommended its use as a substitute for locally prepared subject index. As a guide, it can be used for constructing an alphabetical subject index to the systematic part of a classified catalogue; or a syndetic subject catalogue forming part of a dictionary catalogue. The immediate purpose of the Relative Index is to help a classifier to find the appropriate class number for a specific subject. Its use as an effective guide to construct subject indexes could be facilitated if the rules of procedure for deriving subject-propositions would have been explicitly stated - along with the postulates of subject analysis forming the foundation of the design of DC Schedules. Unfortunately, neither the postulates of structures, nor the rules of procedure are mentioned
anywhere. They are implied in the design of DC Schedules and the Relative Index. The structure of subject-propositions in the notational plane in the DC Schedules has been distilled out by analyzing the structure of the class numbers; and it has been presented in the earlier section. This task has been comparatively straight-forward because of the postulates of the General Theory of SIL. But the task of distilling out the procedure of preparing a Relative Index is not at all straight forward. A thorough study has been carried out to distil out the basic components of the procedure of constructing a Relative Index (9,19). As Dewey has not said anything about the procedure, and as this has been the first attempt to distil the rules of procedure for Relative Indexing, the immediately relevant findings of this study are presented here. This is essential to recognize the surface structure of the subject-propositions to be prepared according to the rules of Relative Indexing.

One basic fact about Relative Indexing is that the subject-propositions are all derived from the class numbers and their verbal interpretations in the DC Schedules. How those subject-propositions are derived is demonstrated in the following sections.

= 208 =
Consideration of the Schedule Entry

The first step in Relative Indexing is to consider a schedule entry. For example, consider the schedule entry "631.3586 Sugarcane". It consists of two parts: (1) the class number; and (2) the name of the specific subject. In naming the specific subject, highest economy of words has been used because of its occurrence in succession with its superordinates of different removes.

Interpretation

The next step is to interpret the schedule entry by applying the Principle of Context. According to this principle, the denotation of a term in a schedule entry is to be determined in the light of the different specific subjects successively superordinates to it.

The subject considered occurs in its hierarchy as shown below. The status of each component in terms of elements and modifiers is also indicated.

630 = Agriculture (=D)
631 = Farm (=E)
631.3 = Farm machinery/tools (=E as part)
631.35 = Harvesting (=m)
631.358 = Special crops (=m)
631.3586 = Sugarcane (=m)

= 209 =
By applying the Principle, we arrive at the following denotation of the schedule entry:

631.3586 = Sugarcane harvesting machinery

53 Modulation

The next step is to augment the name of the specific subject into a modulated name of subject by introducing the superordinates of different elements with reference to the schedule. In this step, the structural analysis is completed. For this purpose, need may arise to interpolate the missing links implied in the structure of the schedule. For example, the schedule entry "583 Dicotyledones" suggests the following hierarchy: 580 Botany / 583 Dicotyledones. But, in fact two essential links are missing here. The logical hierarchy in the idea plane consists of the following links: Botany, Plant groups, Flowering plants, Dicotyledones.

The result of modulation of the subject considered would be as follows in a non-expressive form:

Agriculture (D) Farm (E) Farm machinery/tools (E as Part) - Harvesting (m). Special crops (m) Sugarcane (m)

This modulated name of subject in its full expressive form will be as follows:

= 210 =
Agriculture, Farm, Farm machinery/tools,
Harvesting machinery, Special crop harvesting
machinery, Sugarcane harvesting machinery.

54 Unipartite Inverted Name

The name of the specific subject is
"Sugarcane harvesting machinery"

It can be expressed in more than one ways as follows:

(1) Harvesting machinery for sugarcane; and
(2) Machinery for harvesting sugarcane.

Among the different versions of expression of the
one and the same specific subject, the sequence of the
substantive terms in the name "Sugarcane harvesting
machinery" is in reverse order of the sequence of these
terms in the non-expressive modulated name. For
convenience of reference let us call such a name a
"Unipartite Inverted Name-of-subject", or a "Compact
Inverted Name of Subject". In none of the other versions,
the sequence of the substantive terms is in directly
inverted order of the sequence of these terms in the
non-expressive modulated name of subject.

Similarly, the specific name of subject corres-
ponding to class numbers 631.35 may be either (1)
Harvesting machinery; or (2) Machinery for harvesting.
Of these, the first is a compact inverted name, while
the second is not.
55 Multipartite Inverted Name

Corresponding to the Class Number "631.3", the specific name of subject "Farm machinery" is not an "inverted name". If we want to convert it into an "inverted name", the form will be "Machinery Farm", there is some peculiarity of this name. It is not a compact name as "Harvesting machinery", and "Sugarcane harvesting machinery" are. In constructing this name, the principle of inversion has been applied; but initially that has resulted in the name "Machinery". This is not the coextensive name of the specific subject corresponding to the class number "631.3". For this reason, from among the terms occurring earlier to it in the non-expressive modulated name, the earliest one that proves necessary and sufficient to express the specific subject concerned has been chosen; and the result has been a non-compact name: "Machinery Farm". This name has two distinct parts. Each part has a distinct function of its own. For example, the term 'Machinery' has 'specified' the subject; and therefore, it has the "specification function". The term 'Farm' has denoted the context of the "specification"; and therefore, it has the "contextual function". For convenience of reference, let us call such a name a "Multipartite Inverted Name."
It may be noted here, that the complexity of determining the multipartite inverted name owes its origin to Cutter's concept of "specific subject".

56 Preparation of Subject-Propositions

The procedure for deriving subject-proposition may be generalized as follows:

(1) The "modulated name" is to be used as the basis for deriving the specific subject-proposition for the relative index.

(2) For the specific subject concerned, the "inverted name" is to be prepared. It may be a compact unipartite name, or a multipartite name.

(3) The "inverted name" is to be used as the primary subject-proposition for the specific subject concerned. This is the most important principle of Relative Indexing. This principle is followed uniformly to avoid parallelism with schedule entries. Example: Harvesting machinery. Of course, the term 'Harvesting machines' has been preferred in the Relative Index of DC. The term currently in use is preferred as far as practicable.

(4) If the "inverted name" as a whole, or the specification part of it admits of a synonym likely to be used as a sought or search term, the synonymous search term is to be used to prepare a secondary subject-proposition. For
example, the term 'Tools' may be deemed to be a synonym for 'Machinery' in this context. If the primary subject proposition is 'Machinery Farm' it will warrant a secondary subject-proposition: 'Tools Farm'.

(5) The term 'Farm machinery' can also be deemed to be a synonymous search term for 'Machinery' in the context of 'Farm'. But 'Farm machinery' is a construct violating the Principle of Inversion. If such a construct is to be admitted, for reasons of convenience of users, as a secondary subject-proposition, a contextual part is to be added with it. For example, 'Farm machinery agriculture'.

(6) On the basis of the same argument, the preparation of the secondary subject-proposition 'Farm tools agriculture' may be justified. But in the context of the subject-proposition 'Farm machinery agriculture', the new one would be ineffective; for, in alphabetization, both these constructs would be grouped under 'Farm'; and 'Farm machinery agriculture' would come before 'Farm tools agriculture'. For this reason, the latter is not used as a secondary subject-proposition.
(7) The term 'Agricultural machinery' may also be deemed to be a sought term for the specific subject "Machinery farm". This construct again violates the principle of inversion. This is a compact name; and 'Agricultural' is not the immediate superordinate of 'Machinery'. Further, it has no contextual part; but, the term 'Agricultural' in the adjectival form is indicative of the context of 'Machinery'. A construct satisfying all these conditions is admitted as a secondary subject-proposition.

(8) In the context of the subject proposition 'Agricultural machinery' already made, the synonymous subject proposition 'Agricultural tools' is ineffective for the reason of their positions in alphabetization.

(9) If a multiworded subject-proposition contains in it a word which is decidedly significant as a sought term for the subject concerned, an inverted secondary subject-proposition is to be prepared. For example, 'Agricultural machinery' would call for "Machinery agricultural".

(10) In the context of the subject-proposition 'Machinery agricultural', the primary subject-proposition 'Machinery farm' constructed earlier, may be considered ineffective for reason of their positions in alphabetization.

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But, a secondary subject-proposition cannot render a primary subject proposition ineffective. Therefore, both would stay.

(11) The subject proposition 'Agricultural tools' was considered ineffective in the context of the subject proposition 'Agricultural machinery'. But, the latter would warrant an inverted subject-proposition 'Tools agricultural', and it would come before 'Tools farm' in alphabetization. Both these subject-propositions are secondary. Therefore, which comes earlier in alphabetization would render ineffective what comes later.

(12) If a subject-proposition is such that it has been further subdivided in the schedule, it is to be indicated by some device - such as, black face in printing, and all-caps in writing.

(13) It is preferable to prepare a general cross reference in the following style as a substitute for specific subject-propositions under a particular Form Modifier:

Encyclopedia special

See subject.
Let us now consider the following chain of DC class numbers for preparing relative index entries for them:

630  = Agriculture
631  = Farm
631.3 = Farm machinery
631.35 = Harvesting
631.358 = Special crops
631.3586 = Sugarcane

According to the prescriptions mentioned above, this chain of DC class numbers would warrant the following relative index entries:

Agricultural machinery  631.3
Agriculture  630
Farm  631
Farm machinery agriculture  631.3
Harvesting machines  631.35
Machinery agricultural  631.3
Machinery farm  631.3
Sugarcane harvesting machines  631.358
Tools agricultural  631.3

It may be noted here, that in the Relative Index of the 12th edition of DC the subject propo-
sition 'Sugarcane harvesting machines' does not occur, though it seems to be quite logical to have it prepared according to the prescriptions. If it is not considered to be a case of mistake, the reason for this can be explained only as follows:

If a substantive term (other than the first) occurring in a compact unipartite inverted name has been used as an admitted subject proposition, and the class number refers to a portion of the schedule which is not elaborately subdivided, then the entry under the specific subject-proposition can be omitted for the sake of economy. In relation to the case under consideration, the admitted entry "Harvesting machines 631.35" satisfies the conditions mentioned above; and therefore, the subject proposition "Sugarcane harvesting machines" has been omitted. This principle of omission seems to have played a significant role in the preparation of the Relative Index.

Other rules for omission mentioned above have disqualified the entries such as the following:

Agricultural tools 631.3
Crop harvesting machines 631.35 (deemed to be unsought)
Harvesting machinery 631.35
Harvesting tools 631.35
Special crop harvesting machines 631.358 
(deemed to be unsought)
Tools farm 631.3

Another important point to be noted here is that for the compound subjects, the class numbers of which are to be constructed by combining two or more class numbers, or their parts, do not have their corresponding entries in the Relative Index to DC. The reason is obvious; it is not practicable. But for a library, it is possible to prepare entries for them by following the prescriptions mentioned above.

58 Structures of Compound Subject-Propositions for Relative Indexing

The structures of DC compound class numbers have been identified to be as follows:

\[
\begin{align*}
D, E & - m \\
D, A & - m \\
D, P & - m
\end{align*}
\]

\[
\begin{align*}
D, E ; & A \\
D, E ; & P
\end{align*}
\]

On the basis of the demonstration furnished above, it can be said that the structures of compound subject
propositions for Relative Indexing, in all cases, are just the reverse order of the components of class numbers. These structures emerge from the structures of class-numbers through the rules for reversing their sequence; and through the rules for eliminating the redundant manifestations. Consequently, these surface structures are derivable from the deep structure of SILs.