Structure in database indexing*

James D. Anderson

The author is Associate Professor of Library and Information Studies, Rutgers—the State University of New Jersey, and Head of Design Team, Bibliography Revision Project, Modern Language Association of America, 1978-79

Structure in database indexing provides the capacity for flexible organization in printed indexes and focused access in on-line searching. As part of its Bibliography Revision Project, the Modern Language Association's Revision Team has designed prototype indexing systems incorporating varying levels of structure. The highly structured CIFT system (Contextual Indexing and Faceted Taxonomic Access System) permits the production of both classified arrays based on various taxonomies and alphabetic indexes with contextual modifiers in which the order of index elements can be matched to particular needs. Similar flexibility is provided for on-line searching. Searches can be focused on one or a number of categories or classes of terms. CIFT prototypes are contrasted with the less structured indexing system currently used for the MLA International Bibliography and even less structured keyword indexing approaches. The work described here is still in progress.

There is a subtle, but important, distinction between flexibility of access and flexibility of organization. The former provides variegated access to a particular item, while the latter determines the eidos [shape, form, logical structure] within which a search query can be formulated. . . . Sophisticated and varied access cannot totally compensate for a lack of consistent organization.—S. Michael Malinconico

Introduction

Indexes are often analysed as linguistic systems, with the terminology representing the semantic aspect and the way in which the terminology is arranged or put together the syntactic aspect. The semantic aspect includes the degree of control applied to the use of terms, the relationship between terms and concepts, relations among concepts and the terms which represent them, and the way in which compound concepts are expressed. The syntactic aspect deals with the structure of the index and its entries, including the organization of index elements and their relationships.

In this paper, I want to focus on the role of structure, and the resulting flexibility of organization and access, in database indexes. I shall discuss structure as it relates to the various prototypes which have been developed for the Bibliography Revision Project of the Modern Language Association of America.

The Modern Language Association has published an annual bibliography for over fifty years. Since 1956, it has been international in scope, and it now lists some 40,000 scholarly works on language, literature and folklore each year.

Beginning in 1970, the MLA International Bibliography was among the first, if not the first, major bibliographic databases in the humanities to adopt computerized methods for compilation, editing, arrangement and typesetting. In 1978 it was made available for on-line searching via Lockheed's Dialog service. Nevertheless, its method of indexing has not yet changed except in incidental details. Subject access is still limited to a one-dimensional, enumerative classification based on traditional taxonomies of language, linguistics, literature and folklore which have developed over the more than 50 years since the Bibliography's beginning. An alphabetical index to authors of listed documents is provided, but no alphabetical subject index. In the printed version, there is no direct access to specific literary authors. There is no direct access and only very limited indirect access to literary genres, literatures of specific countries, themes treated in literature, approaches used in literary study, specific literary works, literary movements and schools, literary influences, and similar aspects. Except for documents on general topics, all manual searching has to be channelled through national literature, sometimes through place, period and literary author. Specific literary

* Text of the paper delivered at the Annual Meeting of the American Society of Indexers, New York City, 5 May 1979.
authors can be located only if their national literature, place and period are known. Similar constraints apply to language, linguistics, and folklore as well.

Although indexing by this one-dimensional, enumerative classification has not changed, on-line access has freed searchers from some of its constraints, since direct access is now possible to any subdivision of the classification, and free-text searching of titles, explanatory glosses, classification descriptors, journal citations and monographic imprints is possible as well. While this benefits the on-line searcher, users of the printed bibliography still encounter traditional limitations.

For these reasons, the Modern Language Association approached the National Endowment for the Humanities with a proposal to design an 'advanced bibliographic system' to provide additional and flexible access for users of the printed bibliography and more detailed indexing for both the printed and on-line versions of the database, while making maximum use of currently available technology. The National Endowment provided funding, and the prototypes which I will discuss were developed as a part of this project.

Levels of Structure

Structure in an index provides the capacity for organization. In printed indexes, this organization is displayed in the arrangement and format of entries. In an on-line index, structure provides the possibility of multiple arrangements in output and increases the options for organizing searches in an on-line mode. Few, if any, indexes are entirely without structure. Modern library catalogues, for example, are highly structured indexes. They consist of entries which are made up of many formal elements, such as title proper, sub-title, statement of responsibility, edition statement, imprint (itself consisting of place, publisher, and date), descriptions of physical extent, illustrations and size, titles of related works, names of responsible persons and corporate bodies, names of subjects, and classification notation. This structure is even more detailed in the MARC (Machine-readable Cataloguing) format. Such structure provides the possibility of organizing or arranging library catalogues on the basis of any or all of these elements, or of using them as the basis for limiting or organizing on-line searches.

Library catalogues could have been designed with a minimum of structure. Such a catalogue could, for example, consist of entries containing all words from title-pages, title-page versos, tables of contents, indexes, or even of the whole text, input in no particular order. Such a completely structureless index—if index it may be called—provides the fewest arrangement possibilities and accommodates the fewest varieties of search strategy. Arrangement would be limited to an alphanumeric arrangement based on the words in the entry or to groupings based on the frequency of word occurrence, either singly or in various combinations. Searching would be limited to word-based, free-text approaches. I know of no regularly produced index so completely lacking in structure.

In library catalogues, the descriptive part of the entry, the part which identifies the particular item, is usually much more structured than is the part which describes the content or subject and internal form of an item. Subject headings are often connected with extensive networks of 'see,' 'see also' and their reciprocal references. These networks can be used for grouping entries or for altering the scope of searches, but since the structure of these networks is neither coherent nor consistent (for example, broader/narrower and nongeneric relationships are not distinguished), the results of such arrangements or searches are unpredictable. There is no syntactic relationship among headings assigned to a given document, however. These headings can be arranged only in an alphanumeric order or in statistically determined groups on the basis of term occurrence, and searching can be done only on the basis of the terms themselves. The classification notations commonly used in the United States, whether they be Dewey or Library of Congress, embody even less structure. Although they represent an ordering of items which is based, at least in theory, on affinity and relations of subjects, this arrangement, once decided upon and expressed in currently used notation, cannot be logically altered. This is because the various elements which form the basis for classification, such as discipline, thing, material, activity, agent, place, time, are not differentiated in the notation. The notation represents only the arrangement, not the structure of the classification. (Actually, Dewey notation does express structure to some degree, but not in a consistent or uniform manner.) The resulting notations (and therefore the subjects
they represent, the documents they describe or the entries which they label) can be arranged only in a single, inflexible alphanumeric order, as dictated by the letters or digits of the notations. In this case, the subject description is structured, albeit to varying degrees, but the notation used to express it is essentially structureless, and therefore inflexible. This is why efforts at computer searching based on parts of classification notation have not been very successful. All of this is in contrast to the descriptive part of the entry, in which every formal element is carefully tagged or marked, so that the structure is preserved.

This situation is not, of course, inevitable. The Universal Decimal Classification, for example, uses a notation which preserves, at least partially, the structure of the underlying classification, and thus alternative arrangements or search strategies based on such aspects as place, time, language, ethnic group, document form, and to a certain extent on disciplines, entities, processes and operations, are possible. Similarly, PRECIS indexing uses a structure which identifies such subject categories as places, things, actions, agents, and modifiers, and thus increases the options for arrangement and searching.

Structure in MLA Prototype Bibliographies

The present bibliographic system used to produce the MLA International Bibliography is similar to current library catalogues, as described above, in that the identification of documents is fairly structured, with separate indication of title, authors, and imprint, while the subject description is expressed by means of notation which preserves little or no structure. This notation represents subject description on the basis of a fairly detailed enumerative classification, similar in kind to Dewey or Library of Congress, but as is the case with Dewey and LC, the notation is used only to arrange entries in a single order and to print headings. The underlying structure of the classification is not preserved, with the result that the arrangement cannot be altered without altering the notation, just as is the case with Dewey or LC.

For the on-line version of the MLA International Bibliography, the numerical notation has been translated into the terms which describe the categories of the classification, so that these terms can be searched as descriptors. One of our prototypes consists of the present MLA bibliographic system, augmented by an alphabetical index based on these descriptors. This permits direct alphabetical access to classification descriptors, just as is available now to on-line searchers, but since the type or character of the classification elements is not preserved, the organization of index entry elements is limited to the single order reflected in the classification notation, and the arrangement of entries themselves is limited to simple alphanumeric order or statistical grouping based on term occurrence. In on-line mode, the descriptors can only be searched as words. There is no way to limit a search to such categories as literary authors or places or genres.

The major effort of MLA's Bibliography Revision Project has gone into the creation of an indexing system with a more articulated structure, in order to provide greater flexibility in the organization and arrangement of entries, whether in classified arrays or in alphabetical indexes, and to accommodate more options for planning searches of the on-line database. One of the principal objectives was to design an indexing system which could produce both classified arrays and alphabetical indexes from a single set of input data.

CIFT: Contextual Indexing and Faceted Taxonomic Access System

The system we have developed we call CIFT, short for 'Contextual Indexing and Faceted Taxonomic Access System,' because it is capable of producing both alphabetical indexes, in which the context of each heading (lead term) is defined by the strings of terms assigned to particular documents, and classified arrays, which can be arranged according to multiple taxonomies, whether traditional or exploratory. The bases for classification can be changed at will. For on-line searching, the structure which permits this kind of flexibility in arranging indexes, whether alphabetical or classified, also permits increased flexibility in organizing searches. Searches can be defined by or limited to any of the formal elements of subject and form description, including literatures, languages (as subject), places (as subject), chronological periods, persons (as subject), literary works, themes, influences, operations or processes, methodological approaches, theories, tools or devices, disciplines, document content types, document physical or medium types, or document languages. This kind
of searching flexibility is analogous to that permitted by current descriptive cataloguing conventions, which permit searches to be confined to authors or titles or imprints, and similar aspects. This may seem to be a large number of subject and form elements to worry about, but it is nowhere near the number of elements included in the MARC format for descriptive cataloguing.

Figures 1 and 2 and subsequent figures illustrate how CIFT works. Figures 1 and 2 show indexing worksheets for documents on literature and language, respectively. Indexers are asked to describe documents in terms of the categories listed on the worksheet, in accordance with various indexing policies which are determined by the indexing sponsor and are not inherent in the system. For example, we have defined literature to include any human verbal text, whether conveyed orally, in print, or via audiovisual media. Thus film is included. We have also decided to describe film not in terms of specific literatures, but as a subcategory of literature in general, so that the film *The Conformist* is not described as 'Italian Literature.' (The novel by Moravia, however, is described as 'Italian literature.') This kind of decision is tentative and can be readily changed without altering the system itself or its structure.

Indexing categories which do not apply to a given document are simply omitted. In effect, the worksheet is a questionnaire which asks the indexer, 'Is this document on a specific language or literature, or on language or literature in general?' 'Is it on literature associated with a specific place?' 'Is it on literature of a specific period?' 'Is it on literature by a specific writer or group of writers?' 'Is it on literature of a specific genre?' and so on.

For our CIFT prototypes, we are developing a controlled vocabulary, but the structure of the system and the computer programs which create indexes and classified arrays are not dependent on any particular type of vocabulary. Controlled vocabulary simply means that entries referring to the same concept are more likely to be together than otherwise, and references from synonyms and between broader, narrower and related terms can be provided. This kind of flexibility also applies to the level of precoordination permitted for terms representing compound concepts. We are trying to use a minimum of precoordinated terms so that elemental concepts can be isolated more easily, but usually our decisions are a matter of taste. We could use, for example, 'Blacks' and 'Women' for 'Black women,' but we like the sound of 'Black women' better, so we are using it, at least for the time being, with 'See also narrower term' references from both 'Blacks' and 'Women'.

The order of categories on the worksheets in figures 1 and 2 is the order which we are using for producing classified arrays. In other words, we class literary documents first by literature (in terms of its language), then by performance or physical medium, omitting by default most printed media, then by place with which literature is associated, not necessarily where it was written, then by particular literary author, or group, such as 'Women writers', then by genre, then by specific work, then by theme treated, then by influence, and so on. Anything that doesn't apply to a particular document is simply omitted. Only the first descriptor in each category is used for classification. If it is desirable to class a single document in several places, multiple strings must be used.

The pairs of capital alphabetical letters just to the right of the vertical line in figures 1 and 2 are the tags which identify the elements of the indexing string. Since each element is uniquely identified, the order of elements can be changed at will, so that, for example, a special printout of the database could be made for comparatists arranged first, say, by genre, instead of by language of literature, or by methodological approach for persons interested in methods of literary scholarship. The same kind of flexibility is afforded to searchers of the on-line database.

The order of headings within facets (or categories) of the classification can be alphanumeric or according to other criteria, such as generic relationship or chronology. If the order is not alphabetical or numerical, however, sort codes must be assigned to each heading. For example, within our language facet, we arrange languages hierarchically according to language family relationships. This order is created by assigning to each language descriptor in our thesaurus a sort code or notation which, when sorted alphanumerically, will result in the desired sequence. These sort codes also facilitate generic searching, since in this case, a single notation will retrieve all Indo-European languages or all Germanic languages or all languages in any other linguistic family.

At the bottom of each worksheet (see figures 1 and 2), there is a list of role indicators.
"Novel into Film: Bertolucci's The Conformist"

Lopez, Daniel

1976

Title:

Authors:

Container:

Date:

Vol./pages:

1. Specific persons in RA facet require period (TA) and place (UA).
2. Works in NA facet require either medium (VA) or genre (PA), author (RA), if known, period (TA), and place (UA).

ROLE INDICATORS (Use whenever appropriate to clarify meaning of string.)

Figure 1. Indexing worksheet.

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Title: Suppletion, Spatial Correlatives, and the Boundary Concept

Authors: Nicholson, John G.


DESCRIPTORS (Required facets marked with (1))

| Language | YA (Language) |
| Place | |
| Period | TH (Old) Middle |
| Linguistic aspects | SA (Dialectology) *Grammar *Semantics *Lexicology *Stylistics |
| | *Phonology *Morphology *Etymology *Writing |
| | *Prosody *Syntax *Onomastics systems |
| Persons | RA (1) |
| Parts, properties, aspects | MA (Verbs: *Roots |
| Influences | KA (Stof |
| Operations, processes | JA (Suppletion; & ret * Spatiality; *Deixis; |
| | * Boundary concept! |
| Method, approach | HA (Comparative approach; $stu * East Slavic languages |
| Theories | GA (Russian language! |
| Tools | FA (apo |
| Disciplines | EA ( |
| Other | DA ( |
| Content type | CA (Dissertation abstract! Review article! *Bibliography! |
| Container | BA (Periodical article! Book article! Book! |
| Doc. lang. | AA (English! German! French! Spanish! Italian! Russian! |

ROLE INDICATORS (Use whenever appropriate to clarify meaning of string.)

$api Application in... $inc Includes... $stu Study example:...
$apo Application of... $inx In... $tin Treatment in...
$sapt Applied to... $tstf Influence of... $stof Treatment of...
$sbtm By... $staf Influence on... $stu Study in...
$com Comparison... $sofx Of... $so Use...
$dat [date] $ret Relationship to... $tol Treatment of...[in literature]
$fau For... [audience] $rin Role in...
$for For... $rof Role of... $zot [other: Specify]

1. TA (period) facet is required for major languages with long histories.

Figure 2. Indexing worksheet.
We adopted these indicators so that we could describe the roles of concepts one way when their descriptors act as modifiers of index headings, in another way when they themselves are index headings, and in a third way when they are headings in classified arrays. For example, the role indicator 'tol' permits us to produce an index heading modifier which reads 'Treatment of Sexuality', an index heading (lead term) which reads and files as 'Sexuality—Treatment in literature', and a classification heading which reads 'Themes: Sexuality'.

The index entries produced by CIFT computer programs for the documents described on the worksheets in figures 1 and 2 are as follows:

Alphabetical index entries derived from worksheet No. 1

**FILM.**

*Literature. Film. Italy. 1900-1999.*


[and entries with the same subheading and description under all the other descriptors, except Bertolucci, viz:

ITALY: 1900-1999; THE CONFORMIST (FILM); TECHNIQUE; MORAVIA (ALBERTO)—RELATIONSHIP; PSYCHOLOGICAL APPROACH

The Bertolucci entry becomes]

**BERTOLUCCI (BERNARDO).**


Entries derived from worksheet No. 2

**MORPHOLOGY.**

*Language. Morphology.*

—— Verbs: Roots. Suppletion; Relationship to Spatiality; Deixis; Boundary concept. Comparative approach; *Study example:* East Slavic languages; Russian language. Per. Eng. 23.

[and identical entries under VERBS; ROOTS; SUPPLEMENTATION; SPATIALITY; DEIXIS; BOUNDARY CONCEPT; COMPARATIVE APPROACH; EAST SLAVIC LANGUAGES; RUSSIAN LANGUAGE.]

The indexer determines which descriptors should become index headings (lead terms), and thus produce complete entries, by placing an asterisk in front of the descriptor. We have been exceedingly generous in this regard. In actual practice, economic constraints may limit the number of entries per document in the printed version of the database.

Similarly, the depth of indexing is a policy decision which is independent of the CIFT system itself. In our prototype indexing, we have described the subjects and forms of documents in rather more detail than is currently done for the MLA International Bibliography. For example, MLA does not now routinely identify such categories of information as genres, specific literary works, themes, methodological approaches, or influences. If and when CIFT is implemented by MLA, it is entirely possible that the depth of indexing will, for economic reasons, remain more or less at the current level, with increased indexing limited to selected classes of documents, regarding which there is general agreement that the current level of indexing is inadequate. Such categories include literary criticism and theory in general and general treatment of genres and themes.

The format and organization of index entries is also flexible. The order of elements in our index entries is not the same as that used in our classified entries. In our indexes, genre precedes period and persons, while in the classification, it follows them. This particular format puts a single descriptor with role indicator, if any, on the first line of each entry, as its heading or lead term. The modification or contextual definition of the heading consists of all descriptors from literature or language, medium, place, period, and major linguistic aspects in the second line, and all remaining descriptors in a third line. The lead term is repeated in its place in the string of terms, in order to clarify its role in relation to the other descriptors. Succeeding identical lead terms, succeeding identical second lines under a given lead term, and succeeding identical third lines under identical first and second lines are all suppressed, reducing the unnecessary duplication of descriptors to a minimum. This, of course, is standard practice in traditional, manual indexing. Since each element of the entry is uniquely identified, both the order of elements and the entry format can be changed without any re-indexing.

In the production of both the classified arrays and the alphabetical indexes, we were concerned that large numbers of documents not fall under single entries, but that, on the other hand, entries not be longer than necessary to achieve this goal. To implement this, we have used a procedure we call 'flexible specificity,' which adds additional descriptors to the index or classification string only when needed to reduce the number of documents under an entry. For example, there might be fewer than ten documents in the database on Navajo literature, in which case, the
descriptor ‘Navajo literature’ would be sufficient. In the case of American literature, on the other hand, we might need to use as many descriptors as have been assigned to a document on Hemingway’s *For Whom the Bell Tolls*, including any descriptors for particular parts, properties or attributes, themes, influences, scholarly approaches, theories applied or tools used, in order to reduce the number of documents under each entry to 10 or fewer. The descriptors which are not used in index or classification entries could be added to the ‘gloss’ field of the document citation, so that the information is not lost to users of the printed bibliography. Flexible specificity, of course, does not apply to the online database, but is standard practice in traditional, manual indexing.

Figure 3 shows our classified entries, including entries for the documents described on the worksheets illustrated in figures 1 and 2. Figure 4 shows a larger number of entries in classified order. Figure 5 shows index entries in alphabetical order. Some of these entries reflect earlier indexing policies. For example, more than one place descriptor was used for literary persons such as James Joyce, who, as you all know, is associated by some with Ireland, but lived and wrote in other places.

Less Structured Prototypes

The CIFT system described above produces
ALAWADA THEATER—STUDY EXAMPLE.

AMERICA—TREATMENT IN LITERATURE.

ANNOTATED BIBLIOGRAPHY.
Language.

ANTHROPOLOGICAL APPROACH.

BIBLIOGRAPHICAL APPROACH.

BIOGRAPHICAL APPROACH.

BUREAUCRATS—TREATMENT IN LITERATURE.

CAUSAL EXPLANATION.
Literature. Criticism.
—Treatmnet of Causal explanation. Relationship to Historical inference. Analysis. By Collingwood (R.); Crane (Ronald S.); Popper (Karl). Per. Eng. 8.

CHARACTER ANALYSIS APPROACH.

CHRISTIAN LITURGY—RELATIONSHIP.
Literature. Liturgical drama: Quem quaeritis. 400-1599.

COGNITIVE-DEVELOPMENTAL THEORY—APPLICATION.
Esthetics.

COLLINGWOOD (R. G.)—ROLE.
Literature. Criticism.

COMPARATIVE APPROACH.
Literature. Film. Italy. 1900-1999.

RUSSIAN LITERATURE.
Russian literature. Russia. Chivalric romance. 1500-1599.

COURTLY LOVE AS INFLUENCE.
Russian literature. Russia. Chivalric romance. 1500-1599.

CRITICAL EDITING.
Literature.
—Analytic bibliography; Descriptive bibliography; Textual criticism; Critical editing: Teaching. Syllabus. Per. Eng. 7.

CRITICISM.
Literature. Poetry.
—Relationship to Intention of author. Criticism. Phenomenological approach. Study example: Sceve (Maurice); Diderot (Denis); Valery (Paul); Heidegger (Martin). Per. Eng. 14.

DANTE AS INFLUENCE.

FRANCE.


Figure 5. Sample index entries in alphabetical order. In the figure, we have made the following abbreviations: Bk. = book article, Eng. = in English, Ger. = in German, Per. = periodical article, Span. = in Spanish. Ed.
Figure 5 cont.


JOYCE (JAMES) 1882-1941 AS INFLUENCE.

LANGUAGE.
—See entries under LANGUAGE in classified section of bibliography.
German literature. Austria. Comedy. 1900-1999.

LINGUISTICS.
—Linguistics. History 1200-1299; Treatment of Fallacies (logic); Composition (logic); Division (logic); By English logician: William of Sherwood ca. 1200-1266. Study example: Latin language: Grammar. Per. Eng. 6.

MALE QUALITY.

MATHEMATICAL APPROACH.

NOVEL
—[Under this rubric are listed full entries for each item having 'Novel' in its literature heading, e.g., English literature. England. Novel. 1900-1999.]

SOCIOLINGUISTIC APPROACH.
—Spanish language. Phonology.

highly structured indexes. We have also produced two prototypes with even less structure than the present MLA indexing system, and without vocabulary control. One is a kwic (Key Word in Context) index based only on document titles. The other is a kwic index based on titles augmented with words and phrases selected from

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abstracts, if available, or first and last pages of periodical articles, and prefatory matter, including tables of contents, of books.

Now that we have produced these prototypes, we plan to test their efficacy in document retrieval on the basis of search queries we have collected from reference librarians and members of the Modern Language Association. I have been much impressed by Pauline Atherton's recent research, in which she compared the retrieval effectiveness of MARC records for books, including Library of Congress subject headings and classification notation, with that of MARC records augmented by words and phrases selected from tables of contents and indexes. We plan to adapt her methodology to our comparison studies.

Back to Structure

In closing, I would like to return to the importance of structure in database indexes and to the quote with which I began this paper. S. Michael Malinconico was discussing library catalogues, but as I hope I have convinced you, the same concepts apply to bibliographic databases in general. He wrote:

There is a subtle, but important, distinction between flexibility of access and flexibility of organization. The former provides variegated access to a particular item, while the latter determines the eidos within which a search query can be formulated. Finally, a library catalogue, since it performs a complex function, must of necessity itself be a complex instrument. If it is to serve its function efficiently—to organize and provide access to a collection—it must reveal its logical organization as quickly as possible to users. After sampling a small, appropriate part of the catalogue's contents, users should be made immediately aware of the manner in which queries should be addressed. Sophisticated and varied access cannot totally compensate for a lack of consistent organization. Sophisticated access to a database lacking a coherent structure would result only in statistical access; users would know only that they had succeeded in sampling the universe of entries satisfying their intended query, but they would never know what else might exist that would have satisfied the same query. When a query proves fruitless, if the database being searched does not possess a coherent structure, one can never have confidence that he has indeed come to the end of an unsuccessful search. Thus the usefulness of a catalogue can be directly related to the coherence of its organization and to the ease with which it can make that organization known to a user.

Our keyword indexes, whether searched manually or on-line, can accommodate many, varied, and even sophisticated approaches to single items, depending mostly on the skill of the searcher, but they provide the minimum flexibility of organization. The access they provide is what Malinconico calls 'statistical access.' The kind of search confidence he favours cannot be ensured by structure alone, or even by a combination of structure and controlled vocabulary. It also depends heavily on the work of knowledgeable and skilful indexers. Nevertheless, the level of search confidence can be enhanced by, and is surely related to, the level of structure incorporated into the indexing system.

References


A very large index

The 36-volume index to US Congressional serial reports and documents from 1789 to 1969, published by Congressional Information Service, Inc., Washington, completed publication in December 1979. Its estimated two million references are divided into twelve time spans. Within each chronological division are subject and name sequences, a numerical list of reports and documents, a sequential listing according to the Serial Set published volumes. Full bibliographical citations lead to locations in the original printed volumes or to the full text reproduced on microfiche which has been prepared as a companion collection to the index. The cost of the whole index bought as a complete set is $390 for each of the twelve parts. If bought separately each part costs $435.