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Computer Searching on PRECIS: An Exploration of Measuring Comparative Retrieval Effectiveness

Designing research on the retrieval effectiveness of computer searches on PRECIS (**PRE**served **C**ontext **I**ndex **S**ystem) compared with retrieval effectiveness of searches on other types of subject analysis used in computer-based information sources is a complex process. This paper explores the complexity of measuring comparative retrieval effectiveness through a comparison of the subject analysis provided by the PRECIS system for fifty articles with the subject analysis provided for the same articles by three computer-based information sources: ERIC/CIJE, LLBA/Online, and PsycINFO. Objectives are: (1) To discover factors that should be taken into account when designing this type of research; and (2) To identify extraneous variables that work against internal validity in research design. (Authors)

1. Objectives and methods

Designing research on the retrieval effectiveness of computer searches on PRECIS (**PR**eserved **C**ontext **I**ndex **S**ystem) compared with retrieval effectiveness of searches on other types of subject analysis in computer-based information sources is a complex process. The PRECIS system, used in the British National Bibliography, was designed for producing a printed subject index from data held on machine-readable files. Computer-based information sources, on the other hand, were designed to permit online searching in terms taken from a thesaurus and/or in natural language terms. The logic of comparing unlike systems is open to question. As Bett warns (1), it is unfair to compare PRECIS, a contextual system, with systems designed specifically for computer searching using Boolean logic with single-concept terms.

Why, then, would one wish to do so? Bett continues, "As computer searching is the mode we are now working with, it is useful to see how the various systems can be adapted for online use". The PRECIS *Manual* itself provides a relevant prediction for possible extended usage: "Given the development of certain facilities and the necessary programs they (the strings of terms) could also function as the source of machine-held files of subject data which are capable of direct interrogation by the user, possibly from a terminal at a distant location"[1].

As a preliminary step to conducting a comparative research project on retrieval effectiveness, the PRECIS system was applied to fifty articles for which the subject analysis provided by three sources, ERIC/CIJE, LLBA/Online, and PsycINFO, had been analyzed in two previous studies (3, 4). Ms. Yvonne L. Eveling, B.A., A.L.A., Subject Systems Office, Bibliographic Services Division. The British Library, served as consultant on the construction of PRECIS strings. Any errors in the article remain the authors' sole responsibility. All articles, selected as detailed in the previous studies, reported research on the following topic: psycholinguistics applied to the child's (through age 13) acquisition and development of language and reading skills: background reading for the elementary and nursery school teacher. For purposes of the research. "psycholinguistics" was defined as "the science that investigates the mental processes that underlie language use" (5).

The original aim included comparison of the output from computer searches on the PRECIS subject analysis with the output obtained in the previous studies on identical search structures. Retrieval effectiveness of searches on the subject analysis provided by the PRECIS system was to be compared with the retrieval effectiveness of searches on the subject analysis provided by the three sources. However. exploration of the complexity of measuring comparative retrieval effectiveness proved to be a necessary preliminary step that was taken instead. Reported here. the exploration had two objectives: (1) To discover factors that should be taken into account when designing this type of research; and (2) To identify extraneous variables that work against internal validity in research design. The extraneous variables could stem from a lack of clear indexing policy and/or the inconsistent application of policy rather than from the intrinsic nature of the systems in question.

2. The PRECIS System

According to working procedures detailed in the 1974 PRECIS *Manual* (2), which is the latest edition available at the time of this writing, the PRECIS system expresses concepts in terms selected from natural language encountered in the literature. A major feature of the PRECIS system is that each term is placed in a context-dependent order in such a way that each term sets the next term into its obvious context (6). Syndetic control is maintained through use of a thesaurus. An indexer constructs a statement using nouns arranged in a passive-voice construction to express the concepts in the document being indexed and their interrelationships. Terms in the statement are then placed line by line according to assigned role operators to make up what is called a "string". "Role operators" are prescribed numbers or letters which denote role, or context, in the string. Terms desired as "lead" terms, or entry points in an index, are given check marks, or are "ticked". Additional codes are assigned for computer reorganization of the elements, or lines in the string, into coextensive entries in a process called "shunting".

Figure 1 gives examples of a PRECIS statement, a string, and a set of entries shown along with the subject analysis provided by ERIC/CIJE, LLBA/Online, and PsycINFO for article #13. Note the precision in logic that characterizes the PRECIS system: "children's com-

Figure 1: PRECIS statement, string, and set of entries compared with subject analysis provided by ERIC/CIJE, LLBA/Online, and PsycINFO for article #13.

PRECIS Statement:
Research study, sample population of children, 5–9 years, on children's comprehension of object relative clauses in the English language compared with their comprehension of subject relative clauses in the English language.

PRECIS String:
x 1* children
y p* language skills
y ¶ comprehension of object relative clauses
y t compared with
y q comprehension of subject relative clauses

x 1 English language
y p* clauses $21 relative $21 object
y 2* comprehension $v by
y 3 children
(sub 3 ↑) y 2 comprehension of object relative clauses by children
y t compared with
(sub 3 ↓) y 2 comprehension of subject relative clauses by children
y p* clauses $21 relative $21 subject
y 2* comprehension $v by
y 3 children

z 5 sample populations
z q children, 5–9 years
z 6 research studies

PRECIS Entries:

Children
  Language skills: Comprehension of object relative clauses compared with comprehension of subject relative clauses – *Sample populations: Children, 5–9 years – Research studies*

Language skills. Children
  Comprehension of object relative clauses compared with comprehension of subject relative clauses – *Sample populations: Children, 5–9 years – Research studies*

Clauses. English language
  Object relative clauses. Comprehension by children compared with comprehension of subject relative clauses by children – *Sample populations: Children, 5–9 years – Research studies*

Relative clauses. English language
  Object relative clauses. Comprehension by children compared with comprehension of subject relative clauses by children – *Sample populations: Children, 5–9 years – Research studies*

Object clauses. English language
  Object relative clauses. Comprehension by children compared with comprehension of subject relative clauses by children – *Sample populations: Children, 5–9 years – Research studies*

Comprehension. Object relative clauses. English language
  By children compared with comprehension of subject relative clauses by children – *Sample populations: Children, 5–9 years – Research studies*

Clauses. English language
  Subject relative clauses. Comprehension by children compared with comprehension of object relative clauses by children – *Sample populations: Children, 5–9 years – Research studies*

Relative clauses. English language
  Subject relative clauses. Comprehension by children compared with comprehension of object relative clauses by children – *Sample populations : Children, 5–9 years – Research studies*

Subject clauses. English language
  Subject relative clauses. Comprehension by children compared with comprehension of object relative clauses by children – *Sample populations: Children, 5–9 years – Research studies*

Comprehension. Subject relative clauses. English language
  By children compared with comprehension of object relative clauses by children – *Sample populations: Children, 5–9 years – Research studies*

ERIC/CIJE	LLBA/ Online	PsycINFO
Descriptors	*Descriptors*	*Descriptors*
Cognitive development	Child language	Sentence comprehension
*Comprehension	Psycholinguistics	Sentence structure
*Developmental stages	Concept formation and identification	Preschool age children
Elementary education	Clause	School age children
Research	Age differences in language	Cognitive development
*Sentence structure		Language development
		Age differences
		Developmental stages
	"Phrase" Field	*"Phrase" Field*
	relative clause comprehension developmental differences children aged 5 to 9 years	Not provided for this entry

*Major descriptor

prehension of object relative clauses compared with children's comprehension of subject relative clauses" rather than "children's comprehension of object compared with subject relative clauses". Additional information about PRECIS is presented in a text by Phyllis Richmond written for North American users (7), as well as in the *Manual* mentioned above.

3. Factors affecting comparative research involving PRECIS

Following are several factors that should be taken into account when designing comparative research involving PRECIS and other types of subject analysis, such as the "thesaurus/free text" systems used by the three sources treated in this article:

(A) Indexing is intrinsically related to computerized searching capabilities and cannot be viewed as an isolated activity. A team of both professional indexers and searchers would usefully conduct research in this area. Change in attitude on the part of those who view indexing and searching as discrete activities may be necessary.

(B) Unambiguous operational definitions of terms in research hypotheses is imperative but difficult. The following hypotheses illustrate the problem: (1) High indexer-searcher consistency occurs with use of the PRECIS system; and (2) Heightened retrieval precision results from high indexer-searcher consistency. The assumption behind these hypotheses is that searchers could follow the same procedure as PRECIS indexers by formulating their search strategies according to the presence of concepts with known syntactical roles[2, 3]. The idea of structuring searchers around input structure has not been fully exploited but could lead to precision of output yet to be attained. The credibility of the results of research based on these hypotheses hinges, however, on the operational definitions of "indexer-searcher consistency" and "heightened retrieval precision". These terms are difficult to define in measurable, critically-accepted form.

(C) Search formulations for accessing PRECIS could usefully incorporate concepts coded by their known syn-

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Figure 2: Number of descriptor and "Phrase" fields judged to convey essentially the same subject content information as the corresponding PRECIS statement

ERIC/CIJE	LLBA/Online	PsycINFO
Descriptors, with occasional "Identifiers," including proper names and new terms: 0	Descriptors: 0 "Phrase" fields: 16	Descriptors: 0 "Phrase" fields: 27

tactical roles, as discussed immediately above. However, a common criterion of research design for evaluating natural language retrieval performance is that the compared sources be accessed through identical wording and structure. Comparability of approach is thereby provided. The incongruity of the recommended divergence in search formulation for accessing PRECIS from present practice of identical access requires critical acceptance.

(D) Search design is further complicated by the necessity of selecting the field, or combination of fields, on which searches will be run. Decisions include whether searches will access PRECIS statements, strings, entries, or a combination of these. Another question is whether searches on the sources to whose subject analysis PRECIS is being compared will be made on the descriptor field, any available "phrase" field, or both types of fields. The PRECIS system could also be tested in searches on descriptors if the available option of "string enrichment" has been exercised in constructing the database. According to this option, terms not directly related to the main components of a string may be input as "lead" terms according to instructions[4]. Examples include tests, implications, subject headings not logically included as part of a string, and other desired aspects outside the "core" subject content of a document. The alternative of adding formal headings for specific field searching could be investigated, such as "Tests:".

In addition, the choice of language for searching must be made, whether descriptor language, natural language, or both of these. An implication for worthwhile study suggested by certain outcomes in the two earlier studies mentioned above (3, 4) centered on the use of natural language in searches on the descriptor field.

Output from searches on the "phrase" fields of LLBA/Online and PsycINFO would usefully be compared with results from accessing PRECIS statements. The "phrase" fields in these two sources include such items as major independent and dependent variables, tests, sample population, and type of study[5]. The PsycINFO *Manual* refers to its "phrase" field as "an important and often neglected search element which can aid tremendously in retrieval" (8). Note that the expression of "design" variables in PRECIS strings and in "phrase" fields can be especially challenging. An illustration is the following quotation from one of the articles in a section headed "Design": "A design with two between and one within factors was employed. The between factors were (a) advance organizer-presented vs. not presented by the experimenter, and (b) grade-first vs. fourth. The within factor was relevant versus irrelevant idea units".

Figure 2 shows the number of descriptor and "phrase" fields judged to convey essentially the same subject content information as the corresponding PRECIS statement. The context relationship among the terms was considered to be either explicit or implied without ambiguity. "Phrase" fields in LLBA/Online for sixteen articles and in PsycINFO for twenty-seven were recorded. Both sources would have scored once each had cases resulting from consideration of both the descriptor and "phrase" fields been included.

On the one hand, it could be argued that searchers access only certain terms at a time whether in the descriptor and/or available "phrase" fields. Therefore, the meaning conveyed by the sum of the terms in a field is irrelevant. On the other hand, it could be speculated that the "adjacent" computer search operator, as well as other available "locational" operators, would retrieve with greater precision from fields in which the terms add up to a coherent description of content.

In the case of descriptors, not one set clearly added up to the information provided in the PRECIS statement. The number of descriptors provided by ERIC/CIJE for an article at times tended instead to increase speculation as to what might be the "core" content of the article. ERIC/CIJE also included an "identifier" field for some articles, limited to new terms and proper nouns, such as names of tests given to research subjects. However, the option of supplying identifiers was not utilized in every possible case.

Descriptors assigned by LLBA/Online in one instance transcended their usual function by also representing "implications for further study". "Hearing disorders" and "Mental retardation" appeared among the descriptors for article #31. A paragraph near the end of the article explicitly identified these as implications for further study. The terms were not included in the PRECIS string to avoid increase in length and awkwardness within the statement of context.

Figure 3 shows the PRECIS statement and the descriptors along with available "phrase" fields included in the three sources for article #1. In this case, the "phrase" field of PsycINFO was judged to convey essentially the same information as the PRECIS statement. "Sample populations", "study regions", and "form" were not regarded at this stage. These three aspects are treated below for the special problem they pose for consistent treatment.

(E) A decision must be made concerning the content and format of the subject analysis portion of the bibliographic record for the documents to which PRECIS has been applied: statement, string, entries, or a combination of these. The rationale for this decision is that the full bibliographic record of computer-based services, or any field or combination of fields comprising it, may be printed out for the user as desired. The full record includes citation, abstract, descriptors, "phrase" fields, and any other fields provided by a particular source. Thus, an overall picture of an item is provided in one location.

In some instances, an individual PRECIS entry may not represent the full context included in some of the other entries for a particular document. For example, when a "lead" term appears which has been taken from

Figure 3: PRECIS statement compared with descriptors and available "Phrase" fields in ERIC/CIJE, LLBA/Online, and PsycINFO for article #1

PRECIS Statement:
Research study, sample population of children, 3−8 years, in Sydney, New South Wales, on the influence of age levels on children's comprehension, imitation, and production of use of passive constructions.

ERIC/CIJE	*LLBA/Online*	*PsycINFO*
Descriptors	*Descriptors*	*Descriptors*
*Child language	Psycholinguistics	Verbs
*Language devel-	Child language	Speech development
opment	Voice	Imitations
*Verbs	Age differences in	(Learning)
*Language research	language	Comprehension
*Psycholinguistics		Preschool age
Language learning		children
levels		School age children
Syntax		Language develop-
Verbal development		ment
Sentence structure		
Identifiers	*"Phrase" Field*	*"Phrase" Field*
*Passive voice	passive voice	imitation & produc-
(Language)	acquisition;	tion & comprehen-
		sion, acquisition of
	3 yearolds	passive voice,
		3−8 yr olds

*Major term

a group of connected terms called a "g" block, the remaining components of the "g" block, will not appear in that entry. The block, "imitation, production, and comprehension", provides an example. When "imitation" is placed in the "lead" position, "production" and "comprehension" will not appear in the entry, as shown in Figure 1. They would have appeared, however, if the alternative coordinate concept operator "f" had been assigned.

(F) The decision must be made as to whether the practice of providing "lead", or "entry", terms to focus output is desirable in computerized PRECIS searches. The fact that the computer can search on any word(s) in the text of the given subject analysis may appear to obviate problems associated with assigning "entry" terms as for a printed index. However, it would seem that an adaptation of the option offered by ERIC/CIJE of limiting output to documents retrieved by matches on terms coded as "major descriptors" could beneficially be utilized in the PRECIS system.

A related policy to be established concerns whether or not to "lead" both "general" and more "specific" terms for the same article. An example is provided by the phrase "object relative clauses". In Figure 1, the PRECIS technique known as "differencing" was applied to code each of the following in a "lead" position: "object clauses", "relative clauses", and "clauses". Another example is whether to use "language" as a "lead" term instead of "English language" when it has been determined that specification of "English language" is needed or desired.

The broad term "psycholinguistics" was rarely used by the authors of the articles. The adjective form appeared in only one of the PRECIS strings in the "lead" position as "psycholinguistic processing". LLBA/Online included "psycholinguistics" for one item in the "phrase" field as part of "Illinois Test of Psycholinguis-

tics", and both LLBA/Online and PsycINFO used the term in the adjective form in the "phrase" field for another item. Users would benefit from information about policy related to potential access on relatively broad and narrow terms.

4. Extraneous variables that work against internal validity

The following extraneous variables were identified that threaten internal validity of comparative research design involving PRECIS and other forms of subject analysis:

(A) Treatment of "sample population" of research studies, shown by operator (5) in the PRECIS system, is a major problem. Representation of "educational/age level" adversely influenced retrieval effectiveness in the two earlier studies mentioned above (3, 4) which compared ERIC/CIJE, LLBA/Online, and PsycINFO. In the present study, PRECIS operator (5) was used in every possible case. The total population, with a breakdown as available by age, grade level, and sex, was given, excluding "control groups". In six of the cases in which authors did provide breakdown by sex, they stated that no hypotheses suggesting differences as a function of sex were formulated. Nonetheless, PRECIS assignments included breakdown by sex in these cases. In one instance, although an author stated that "boys performed much the same as girls did in the tests", no breakdown of the total population figure by sex was provided.

LLBA/Online and PsycINFO placed "sample population" in various locations: the descriptor field, or the "phrase" field, or both the descriptor and "phrase" fields, or neither field. Information provided in the "phrase" field was at a more specific level than that provided in the descriptor field. This problem of "dual representation" manifested itself in PRECIS when decisions like these arose: whether to omit "1st grade children compared with 4th grade children" from the subject core of a PRECIS string on the basis that this information is sufficiently represented by "comparative studies" under operator (6), also discussed below; or whether to present "sixty-six before-kindergarden children" under operator (5) when "early readers" forms part of the subject core of the PRECIS string. Note in Figure 1 the variation in treatment of sample populations for article #13 as seen under operator (5) for PRECIS and scattered throughout the subject analysis for the three sources.

Figure 4 shows the number of articles for which the PRECIS assignments and each of the three sources provided information concerning "sample populations" either in the descriptor and/or "phrase" field. The total number for ERIC/CIJE reflects additional acceptance of the following terms which alone satisfied the "sample populations" function in some instances. "Child language", "Children's literature", and "Early childhood education". The number of subjects participating in the research studies was not provided by the three sources. Sex was indicated in only two cases. One source referred to "male 1st graders" in describing an article reporting research limited to male subjects; another source refer-

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Figure 4: Number of articles for which PRECIS assignments and the three sources provided additional information about the reported research

Additional Information About the Reported Research	PRECIS	ERIC/ CIJE	LLBA/ Online	PsycINFO
Sample Populations	50	50	40	45
Study Regions	26	0	0	0
Form	50	37	2	2

Figure 5: Use of operator (5) to accommodate "Study Regions" for article #1
x 1* children
y p* language skills
y q use of passive constructions
y 2* comprehension
y g* imitation $v &
y g* production
(sub 5 ↑) y 2 comprehension, imitation & production of use of passive construction
y s influence $v of $w on
y 3* age levels

x 1* English language
x p* passive constructions $w in
y 2 use
y 2 comprehension, imitation & production by children
y 2 influence of age levels

z 5 sample populations
z q children, 3–6 years
z 5 study regions
z q dNew South Wales
z p dSydney
z 6 research studies

Figure 6: "Form Headings" assigned to the articles
(6) case studies
(6) comparative studies
(6) critical studies
(6) multiple research studies
(6) research studies
(6) research studies
(q) models
(6) research studies
(q) prediction studies
(6) research studies
(q) prediction studies
(q) follow-up studies
(6) theoretical analyses

red to "male & female kindergarden & 1st grade beginning readers" in a description for a different article. "Age level" was indicated more frequently. Inconsistent representation of "sample populations" could lessen the internal validity of comparative research studies. Indexers must establish policies regarding them which they will apply consistently so that search strategies might be planned accordingly.

(B) Operator (5) also provides for representation of "study regions", or location in which the reported research studies were conducted. Inconsistent representation of "study regions" could also lessen the internal validity of comparative research studies. Here, too, indexers need to establish policies which they will apply consistently so that search strategies might be planned accordingly. On the assumption that study sites noted in the articles could hold some interest for readers, the PRECIS strings included the "study regions" given in twenty-six of the fifty articles. Note in Figure 5 the use of operator (5) to accommodate "study regions" for article #1 set in Sydney, New South Wales, Australia. Phrases like the following were also assigned to certain other articles: "The University of Texas Nursery School", "urban parochial school", "midwestern community", and "Minneapolis-St. Paul metropolitan area". The three sources did not identify location for any of the fifty articles either as descriptors or in available "phrase" fields (Figure 4).

(C) PRECIS operator (6) presents the "form" of a document, such as "research studies". Again, searches should be formulated to take account of relevant policy and its application. Figure 6 lists the "form headings" assigned to the fifty articles under operator (6). Subdivisions are represented by "(q)". The form, "comparative studies", was assigned to two articles in which the comparisons were not indicated in the main portion of the strings. One compared "first and fourth grade children" and the other "poor readers and good readers". The question arises whether the user should be able to find the structure of the research design in the main portion of the string rather than solely under operator (6). "Comparative studies" could also lead the user to imagine that one study is being compared with another, rather than that the comparison takes place within an individual study. Note in Figure 5 the use of operator (6) for the form "research studies".

ERIC/CIJE categorized "form" most frequently of the three sources for a total of thirty-seven of the fifty

articles. The "form" indication appeared in the descriptor field. Two terms combining "subject" and "form" were used most often: "Language research" and "Reading research". Figure 3 shows representation of form by ERIC/CIJE through the descriptor "Language research". LLBA/Online indicated "form" in the "phrase" field for two articles, with "replication" used in both cases. PsycINFO also showed "form" in the "phrase" field for two articles, with "Replication of D. McNeill's study" in one case and "7-yr followup study" in the other. "Experimental replication" and "Followup studies" appeared respectively in the descriptor field (Figure 4).

According to the recommendation of the consultant for this study, the use of PRECIS operators (5) and (6) would be limited to serving the function of negative discrimination. The information provided would need to contradict the user's expectation of the document from information conveyed by the previous operators. However, further exploration with consumers of research reports might be in order to ascertain: (1) the degree of interest in the inclusion of information from which the adequacy of the "sample population" can be evaluated, (2) whether indication of "study regions" sharpens perspective about the experiments reported, especially in more complex geopolitical divisions, and (3) whether categorization of the "form" of the research is useful. Direction is also needed in matters like the distinction between a "longitudinal study" and a "follow up study",

and whether "replication" constitutes "form". Operators (5) and (6) cannot be tied to natural language and remain consistent.

5. Summary and implications

Designing research on the retrieval effectiveness of computer searches on PRECIS compared with retrieval effectiveness of searches on other types of subject analysis used in computer-based information sources is a complex process. This paper has explored that complexity through a comparison of the subject analysis provided by the PRECIS system for fifty articles with the subject analysis provided for the same articles by three computer-based information sources: ERIC/CIJE, LLBA/Online, and PsycINFO.

The following factors emerged that should be taken into account when designing research on comparative retrieval effectiveness involving PRECIS: (A) Indexing is intrinsically related to computerized searching capabilities and cannot be viewed as an isolated activity; (B) Unambiguous operational definitions of terms are imperative, such as for "indexer-searcher consistency"; (C) The recommended use of a special search formulation technique for accessing PRECIS to be compared with a dissimilar approach used in searches on other forms of subject analysis requires critical acceptance of the justification for comparing "apples and oranges"; (D) The most beneficial fields to be accessed and types of search input language to be tested in comparative studies must be carefully chosen. In particular, output from searching on "phrase" fields of LLBA/Online and PsycINFO would usefully be compared with output from accessing PRECIS statements; (E) Appropriate content and format for the subject analysis portion of the record display must be determined for representing the documents to which PRECIS has been applied; (F) The decision must be made as to whether the practice of distinguishing "major" terms is desirable for computerized PRECIS searching. A related policy to be established concerns whether or not to "lead" both "general" and more "specific" terms used for describing a document.

Extraneous variables identified as working against internal validity in research design include inconsistent treatment of "sample populations", "study regions", and "form". Suggestions were made for holding their effect to a minimum. Retrieval problems stem from lack of clear indexing policy and/or inconsistent application of policy rather than from the intrinsic nature of the systems in question. Therefore, validity of a research design may be affected.

An implication of the study is the development of standards for organizing and indexing research reports. This project could usefully be undertaken in collaboration with researchers by those sources that include research reports in their databases. Fields could be established for each type of desired information which authors could then provide in a prescribed sequence preceding the body of the article. The organization of articles and the defining of terms would also be useful topics for inclusion in the standards.

6. Conclusion

The above exploration of measuring comparative retrieval effectiveness involving PRECIS and other types of subject analysis concludes positively. Although further attention must be given to the design and methodology of this type of research, including the control of extraneous variables, the prediction is for breakthroughs in the state of the art of indexing for computerized searching. Use of the PRECIS system would productively be expanded into new directions that stand up under the scrutiny of validly conducted investigations.

Notes

1 See (2), p.3.
2 Derek Austin's comments on inter-indexer performance may be applicable to that of indexers and searchers: "To a certain extent, however, PRECIS guards against inter-indexer inconsistency by requiring all indexers to test a subject systematically for the presence or otherwise of certain concepts which have known syntactical roles. A subject containing an action, for example, must be tested for the presence of the object of the action, since this often determines how the rest of the subject should be handled", see (2), p. 5.
3 A somewhat similar idea described by Donald Walker was reported in Int.Classif. 10(1983)No.2, FID/CR News 8, p.91: "In a project to represent the information content of texts, a logical text structure is created, the logical form of the request is determined, the request is related to previous requests, and the analyzed request is matched against the text structure".
4 See (2), p. 411.
5 "Phrase" field is used for simplicity. In actuality, "Index Phrases (Identifiers)" is used by LLBA/Online to describe this field, "Index Phrase" by PsycINFO.

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