

J. John Foote

RESULTS OF A LITERATURE SEARCH ON SUBJECT
ACCESS REQUIREMENTS IN VIDEOTEX (TELIDON)

by

Elaine L. Kozak

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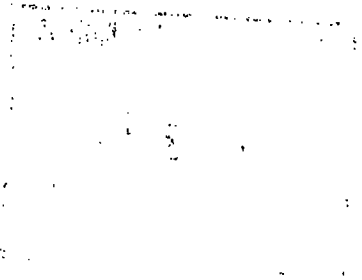
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Results of a literature search on subject access
requirements in Videotex (Telidon)

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Man-machine interaction and its affects on the success of a computerized application have preoccupied information scientists, behavioural scientists and communications specialists since the advent of electronic data processing. As timesharing and on-line system use became more cost effective, a variety of information services were developed for use in this mode. The user group of computerized services was expanded to include people without a technical orientation as a result, and the concern with the user-system interface became more acute. Considerable effort was devoted to identifying user requirements for successful interaction with an information retrieval system. Factors such as terminal equipment, degree of training and experience, the quality and quantity of the information available, and the language and procedures available for communication with the system were found to contribute to user satisfaction.

The introduction of the Videotex variety of information retrieval systems has opened up an entirely new area of computerized information services. The general public is the target user group for these services, and the possible applications envisaged are almost limitless. User-orientedness has been paramount in the design of the facility. This concern for the user has been extended to the design of the banks or stores of information accessible through the system, and to the query interface. The query, or search, interface is comprised of the language and procedures available to the user to communicate with the system, or more specifically, to express the user's information need in a form that the system can "understand" and act upon.

As the initial step in the understanding of user requirements for a query interface to a Videotex-type system, particularly in regards to access to information through the expression of subject parameters, a collection of readings providing background information to the concern has been compiled. Because applications of Videotex-type systems are still limited, information derived from an analysis or assessment of these systems in operation is, for all intents and purposes, non-existent. In compiling the reading list, therefore, studies and experiences in analogous situations, such as those found in library and information retrieval applications, were sought. This was done on the assumption that any findings would be generalizable to a useful degree. In addition, basic information relating to subject organization and description was collected as an introduction to the problem of subject access.

To prepare the list, Library and Information Science Abstracts, Information Science Abstracts, the Annual Review of Information Science and Technology and Library Literature were reviewed, covering an average period of about ten years in each. The specific foci of the search were:

- a) profiles of users of public libraries, because these will be, to a large extent, the users of Videotex-based information services;
- b) community information services, and computerized newspaper information services, because these will form part of Videotex based information services;

- c) user-system interface, particularly the aspects concerned with query language;
- c) searching in information systems;
- d) hierarchical classification techniques and thesaural techniques of subject organization and description.

In all, approximately one hundred and fifty items were identified, and, where possible, individually examined. Of these, some were assessed to be of limited interest, some of peripheral interest, and some of immediate interest. This latter set of items comprises the bibliography which follows this report. If easily obtained, a copy of the item cited was provided in Appendix A. The "nested" bibliographies in the core set of items more than adequately cover the literature deemed of secondary interest, should further research into a specific area be required.

The bibliography is in two parts and organized as follows:

Part I: Reading list on user requirements, and subject organization and control for a query interface in an interactive information retrieval system.

1. User-system interface: introduction to the problem
2. User-system interface: searching
3. Subject organization and description for searching: introduction to the problem
4. Subject organization and description for searching: hierarchical techniques
5. Prospective users and uses.

Part II: Classification, thesauri and indexes of potential use for vocabulary control in Videotex applications.

1. Classifications
2. Thesauri and indexes.

Each section within the two parts begins with a brief, non-analytical summary of the recommended readings for the particular topic. Citations to the literature referred to follow in alphabetical order. When a copy of the item cited has been provided in full or part, a number in parentheses appears to the left of the citation. This serves as a cross-reference to the copy of the item, similarly numbered and arranged in numerical order in Appendix A.

In the compilation of this reading list, no attempt was made to provide a comprehensive listing of potentially relevant literature, or to analyse the information collected for the purposes of making recommendations for changes or developments in the Videotex system. Rather, the aim was to identify select items which together would provide background information for information producers or other persons responsible for, or interested in, the development of banks or stores of information for Videotex systems and the search interfaces to the information.

PART 1: READING LIST ON USER REQUIREMENTS, AND SUBJECT ORGANIZATION
AND CONTROL FOR A QUERY INTERFACE IN AN INTERACTIVE INFORMATION
RETRIEVAL SYSTEM.

1: User-system interface: introduction to the problem

An understanding of the dynamics of human/computer interaction is the first step in avoiding "friction" in use of information retrieval systems, and maximizing the productivity of the interaction.

In Line's (1970) paper, the musings of this well known information scientist provide a rather informal introduction to the issues underlying the design of user-oriented information system. He has no "solutions", but simply underlines the need for behavioural research into information use and transfer. Treu(1971) proposes a "conceptual framework" for the analysis of the problem, and in doing so identifies several human characteristics which should be considered in the design of the interface. The review articles by Bennett (1972) and Martin (1973) provide a very good summary of the research concerns relating to user-system interface as reflected in the literature to that date, supplemented by an extensive and comprehensive bibliography. Of particular interest are sections on system users, information content, and interface design. Barraclough's (1977) article to some extent updates Bennett's and Martin's works, although her focus tends to be bibliographic retrieval systems. Sections concerned with "the information retrieval problem", user expectations, command language and query formulation are noteworthy. Finally, Martin, Carlisle and Treu (1973) summarize the recommendations for user-system interface design made by nineteen information scientists.

- (1) Barraclough, Elizabeth D. "On-line searching in information retrieval". Journal of Documentation. 33(3) 1977, pp. 220-238.
- (2) Bennett, John L. "The user interface in interactive systems". In: Annual Review of Information Science and Technology. Vol. 7. Edited by Carlos A. Cuadra. Washington, D.C.: American Society for Information Science, 1972, pp. 159-196.
- (3) Line, M.B. "On the design of information systems for human beings". Aslib Proceedings. 22(7) 1970, pp. 320-335.
- (4) Martin, Thomas H. "The user interface in interactive systems". In: Annual Review of Information Science and Technology. Vol. 8. Edited by Carlos A. Cuadra. Washington, D.C.: American Society for Information Science, 1973, pp. 203-219.
- (5) Martin, Thomas H.; Carlisle, James; and Treu, Siegfried. "The user interface for interactive bibliographic searching: an analysis of the attitudes of nineteen information scientists". Journal of the American Society for Information Science. 24(2) 1973, pp. 142-147.
- (6) Treu, Siegfried. "A conceptual framework for the searcher-system interface". In: Interactive bibliographic search: the user/computer interface. Edited by Donal E. Walker. Montvale, N.J.: AFIPS Press, 1971. pp. 53-66.

2: User-system interface: searching

Users could be expected to feel most comfortable using a system which permitted them to search for information in a manner consistent with their customary methods of doing so. The design of a system for search and retrieval functions should, therefore, take the characteristics of human information seeking behaviour into account.

In his paper, Saracevic (1978) succinctly outlines the problems in "question analysis", or, the formulation of a question, and then its translation into terms an information retrieval system can respond to. He does not provide solutions to the problems, but points to relevant theory and suggests possible experiments to study "question analysis" further. Tagliacozzo and Kochen (1970) report on a study which attempted to "reveal some characteristics of human information seeking behaviour", by examining searching behaviour of users of a library catalogue, as one type of directory. The study described by Bates (1977) also looks at searching behaviour using a library catalogue, but from the point of view of subject access. The problem that is identified in this study is the frequent mismatch between the words a searcher will use to describe a subject, and the words used to describe the subject in the catalogue (the interface between user and information in this case). Thompson (1971) also addresses the problems of query formulation in an information system, but the context in which this is done, that of a hierarchical, tree-structure index to an information retrieval system, makes this item particularly interesting. The system in question is also the subject of the article by Seastrom and Thompson (1973). Clauer (1972) also deals with the idea of a hierarchically based query interface in information retrieval, claiming that it is a "natural process" for searching (only a summary of this report is available). Finally, the reference to Keen's theses is included because it is expected to be a significant work in the area. It would appear, however, that this theses has not yet been published.

- (7) Bates, Marcia J. "System meets user: problems in matching subject search terms". Information Processing and Management. 13(6) 1977, pp. 367-376.
- (8) Clauer, Clavin Kingsley. An experimental evaluation of hierarchical decision-making for information retrieval. Ph.d. Theses, Stanford University, August 1972. 83p. (also: IBM Research, San José, California, 1972).

Keen, E.M. Search strategy evaluation in information retrieval systems. MSc. Theses, University of Sheffield, n.d.
- (9) Saracevic, Tefko. "Problems of question analysis in information retrieval". In: The Information Age in Perspective. Proceedings of the 41st Annual Meeting of the American Society for Information Science, New York, N.Y., November 13 - 17, 1978. Vol. 15. Edited by Everett H. Brenner. White Plains, N.Y.: Knowledge Industry Publications, Inc., 1978. pp. 281 - 283.
- (10) Seastrom, D.E. and Thompson, D.A. "ADMIRE - a study of an adaptable document retrieval system with assistive displays". In: Innovative Developments In Information Systems: their Benefits and Costs. Proceedings of the 36th Annual Meeting of the American Society for Information Science, Los Angeles, October 21 - 25, 1973. Vol. 10. Edited by Helen J. Waldron and F. Raymond Lang. Washington, D.C.: ASIS, 1973. pp. 207 - 208.

- (11) Tagliacozzo, R. and Kochen, M. "Information-seeking behaviour of catalog users". Information Storage and Retrieval. 6(5) 1970, pp. 363-382.
- (12) Thompson, D.A. "Interface design for an interactive information retrieval system: literature survey and a research system description". Journal of the American Society for Information Science. 22(6) 1971, pp. 361-373.

3: Subject organization and description for searching: introduction to the problem.

If the subject coverage of an information service is not mapped out for users in a way which will permit them to quickly and easily recognize that the information they need is in fact available, they will not be inclined to use the service, or, if they do, will not do so effectively.

F. Wilfrid Lancaster is one of the best known researchers and writers concerned with subject organization in information systems. His 1972 book (cited below) is a classic in the field. A copy of the first chapter of this book, "Why Vocabulary Control" is provided, along with two chapters ("Factors Affecting the Performance of On-line Searching Systems"; and "Vocabulary in the On-line System") from his 1973 book, as an introduction to this area of concern. Lancaster identifies a set of "intellectual factors relating to the data base itself" (1973) which are the crux of the issue, and goes on to discuss the role of the vocabulary in the query language of an information retrieval system, and the various types of vocabularies that have been developed.

Vickery (1971) supplements Lancaster's ideas somewhat with a discussion of the relationship between structure and function in a retrieval language.

Lancaster, F.W. Vocabulary control for information retrieval. Washington, D.C.: Information Resources Press, 1972.

- (13) Excerpt: Chapter 1
- (14) Excerpt: Chapter 5

Lancaster, F.W. and Fayen, E.G. Information retrieval on-line. Los Angeles: Melville Publishing Co., 1973.

- (15) Excerpt: Chapter 7
- (16) Excerpt: Chapter 11

- (17) Vickery, B.C. "Structure and function in retrieval languages". Journal of Documentation. 27(2) 1971, pp. 69-82.

4: Subject organization and description for searching: hierarchical techniques

Because of the essentially hierarchical structure of the Videotex query interface, hierarchical techniques of organizing information currently in use should be examined for possible application. The literature on these techniques and their use is extensive, but a few key works providing background in a fairly concise form were identified.

Although rather abstruse, Studer's (1978) article provides an interesting theoretical framework from which to view hierarchical structures. Abrera(1974) looks at the historical and philosophical basis of the classified structure and its application in the organization of knowledge. Schneider (1974) discusses classification in the context of modern information system needs. The collection of works edited by Maltby (1972) looks further at the role of classification given present day needs and applications, considering the major classification schemes in use individually. A copy of this item is not provided.

As an introduction to the thesaurus technique of subject organization, a chapter titled "Vocabulary control in post-coordinate systems: the thesaurus" from a previously cited book by Lancaster (Vocabulary Control for Information Retrieval, 1972), and one of the original papers on what was then a new approach (Joyce and Needham, 1958) are provided. Toman (1970) analyses the advantages and disadvantages of both techniques (classificatory and thesaural) for organizing information.

- (18) Abrera, Josefa B. "Traditional classification: characteristics, uses and problems". Drexel Library Quarterly. 10(4) 1974, pp. 21-36.
- (19) Joyce, T. and Needham, R.M. "The thesaurus approach to information retrieval". American Documentation. 9(3) 1958, pp. 192-197.
Maltby, Arthur, ed: Classification in the 1970's: a discussion of development and prospects for the major schemes. London: Clive Bingley, 1972.
- (20) Schneider, John H. "Modern classification: characteristics, uses and problems". Drexel Library Quarterly. 10(4) 1974, pp. 21-36.
- (21) Studer, Paul A. "Classification as a general systems construct: the significance of hierarchical structure". In: The Information Age in Perspective. Proceedings of the 41st Annual Meeting of the American Society for Information Science, New York, N.Y., November 13 - 17, 1978. Vol. 15. Edited by Everett H. Brenner, White Plains, N.Y.: Knowledge Industry Publications, Inc., 1978. pp.337 - 340.
- (22) Toman, J. "The influence of information retrieval on the structure of indexing and classification systems". In: Library Systems and Information Services. Proceedings of the Second Anglo-Czech Conference of Information Specialists. Edited by D.J. Foskett, A. de Reuck and J. Coblans. London: Crosby, Lockwood & Son Ltd., 1970. pp. 57 - 66.

5: Prospective users and uses

In addition to users' behavioural characteristics in an information-seeking situation, their social and demographic characteristics, and their information needs will have implications for the design of a retrieval system. Since the clientele of public libraries as a defined information seeking and using population most closely resembles the target user group for Videotex-type services, profiles of this population could prove useful. Studies of users of public libraries abound, but the majority are parochial in nature and of limited interest. The article by Zweizig and Dervin (1977), and the study on which it is based is an exception, because of its currency, some of its findings, and the potential framework it provides for studies of users in other information service contexts. Summaries of the presentations made by participants in a panel discussion on "On-line access for the man in the street" (1976), while not providing substantive analyses of the issue, indicate the direction of the thought on this matter in the field.

Two areas in which the initial applications of Videotex systems are likely to be found are computerized information services, and community information services.

Rhydwen (1977) and Rothman (1972) describe development of two newspaper data bases for on-line searching, the Toronto Globe and Mail data base, and the New York Times Information Bank.

Several items relating to community information services are cited (Donohue, 1972; Dowlin and Fuller, 1975; Goldman and Fulford, 1976; Tague, Walters, and Sheperd, 1976; and the entire first issue of the 1976 Drexel Library Quarterly). These articles are of varying interest, however, and only a copy of the Tague, Walters and Sheperd paper is provided. This paper provides background information on the concept of community information services, and describes an attempt to develop a computer-based community information service. Of interest in this report is the perception of the users of the service and their requirements.

Donohue, Joseph C. "Planning for a community information centre". Library Journal. 97(18) 1972, pp. 3284-3288.

Dowlin, K.E. and Fuller, E. "Community information center: talk or action". In: The use of computers in literature searching and related reference activities in libraries. Proceedings of the 1975 Clinic on Library Applications of Data Processing, April 27-30, 1975. Edited by F.W. Lancaster. Urbana-Champaign, Ill.: University of Illinois, 1976.

Drexel Library Quarterly. 12(1&2) 1976.

(This issue, titled "Information and Referral Services in the Public Library", examines several types of public and community information services from a variety of perspectives)

Goldman, Phyllis, and Fulford, Joan. "LINK information and referral service". Ontario Library Review. 60(3) 1976, pp. 166-171.

- (23) "On-line access for the man in the street". Panel Discussion moderated by J.L. Bennett in: Information Politics. Proceedings of the 39th Annual Meeting of the American Society for Information Science, San Francisco, Calif., October 4-9, 1976. pp. 144-150.
- (24) Rhydwen, D.A. "Computerized storage and retrieval of newspaper stories at the Globe and Mail Library, Toronto, Canada". Special Libraries. 68(2) 1977, pp. 57-61.
- (25) Rothman, John. "The New York Times Information Bank". Special Libraries. 63(3) 1972, pp. 111-115.
- (26) Tague, J.; Walters, C.; and Sheperd, M. "The distribution of community information: the role of the computer and computer-based networks". Aslib Proceedings. 28(9) 1976, pp. 314-321.
- (27) Zweizig, D. and Dervin, B. "Public library use, users, uses: advances in knowledge of the characteristics and needs of the adult clientele of American public libraries". In: Advances in Librarianship. Vol. 7. Edited by M.J. Voight and M. J. Harris; New York; Paris; London: Academic Press, 1977. pp. 231-255.

In the course of the literature search, a number of articles concerning cable television application in public library services were encountered. Although this is only a peripheral area of interest, the references to these articles are given below. Copies of the papers have not been provided, however.

Dale, Brian. "Cable television and large public libraries: the state of the art in Canada - 1971." Canadian Library Journal. 29(2) 1972, pp. 97-103.

Dowlin, K.E. "CATV+WCPL = VRS". Library Journal. 95(15) 1970, pp. 2768-2770. (This describes a broadcast reference service over a community TV system).

Genova, B.K.L. "The cable/libraries interface". In: Information Politics. Proceedings of the 39th Annual Meeting of the American Society for Information Science, San Francisco, Calif., October 4-9, 1976. Vol. 13. Edited by S.K. Martin. Washington, D.C.: ASIS, 1976.

Kenney, Brigitte L. "The future of cable communications in libraries". Journal of Library Automation. 9(4) 1976, pp. 299-317.

PART II: CLASSIFICATIONS, THESAURI AND INDEXES OF POTENTIAL USE
FOR VOCABULARY CONTROL IN VIDEOTEX APPLICATIONS.

1: Classification Schemes

The classification schemes most commonly employed in the organization of bibliographic information are the Dewey Decimal System (DDC), the Library of Congress Classification (LC) and the Universal Decimal Classification (UDC). The objective in the development of these schemes was to create a logical method of arranging library materials on shelves so that books on related subjects would be in close proximity to each other. In the case of DDC, and consequently UDC as it was based on DDC, an attempt was made to develop this system of shelf order on the basis of a breakdown of universal knowledge. LC's orientation is more utilitarian, being derived from the specific needs of the Library of Congress for its own collection (albeit a very extensive one).

The main classes in each classification are shown on photocopied excerpts from main works. (Dewey, 1971; Immroth, 1971; British Standards Institute, 1973). Either DDC or UDC would appear to have some potential for providing either a universal schema, or specific classes or subclasses on which to base a hierarchical method of subject organization. The LC scheme may be useful for providing a classified breakdown of a specialized subject area.

DDC and LC fall short in the subject access they provide. Each is accompanied by an alphabetical index or list of subject terms (Relative Index to DDC; LC Subject Headings). If a classified hierarchical tree structure remains the basis of the Videotex retrieval system's query language, a similar provision may have to be made to assure adequate subject access. If a supporting alphabetical subject index is developed for a Videotex application, the DDC Relative Index, or, to a lesser extent, the LC Subject Headings could be a source of subject terms. DDC is the most commonly used classification scheme in North America, and is the standard of most public libraries. The index vocabulary covers a broad range of subjects at the level of common usage.

Of the three schemes, UDC provides the best subject access because of its synthetic structure (see Mills, 1964 and the British Standards Institute, 1963). The vocabulary is strongly oriented to science and technology, but the structure and system of organization of this classification might provide a useful approach for developing a hierarchical query interface providing reasonable subject access. Of course, thorough study of each scheme is necessary to fully assess its appropriateness to a specific Videotex application.

- (28) British Standards Institute. Guide to the Universal Decimal Classification (UDC). B.S. 1000C:1963. London, 1963. Excerpt: pp. 50-51

Canadian Library Association. Technical Services Section. A list of Canadian subject headings. Ottawa: CLA, 1968.

- (29) Dewey, Melvil. Dewey Decimal Classification and Relative Index. 3 vols. 18 ed. New York: Forest Press, Inc. of Lake Placid Club Education Foundation, 1971. Excerpt: pp. 87-98

- (30) Immroth, J.P. A guide to the Library of Congress Classification. 2 ed. Littleton, Colo.: Libraries Unlimited Inc., 1971. Excerpt: pp. 31-34.

Library of Congress. Subject Cataloging Division. Processing Department. Library of Congress Subject headings, 8 ed. Washington, D.C., 1975.

Mills, Jack. The Universal Decimal Classification. Vol. 1, Rutgers Series on Systems for the Intellectual Organization of Information, edited by Susan Artandi. New Brunswick, N.J.: Graduate School of Library Service, Rutgers, The State University, 1964.

- (31) Excerpt: pp. 9-15
- (32) Taube, M.F. and Feinberg, H. "The Dewey Decimal and Library of Congress Classifications; an overview". Drexel Library Quarterly. 10(4) 1974, pp. 56-74.
- (33) Wellisch, Hans. "UDC: present and potential". Drexel Library Quarterly. 10(4) 1974, pp. 75-89.

Williams, J. G.; Manheimer, M.L.; and Darly, J.E., eds. Classified Library of Congress Subject Headings. 2 vols. New York: Marcel Dekker, inc. 1972.

2: Thesauri and Indexes

The thesauri and indexes listed below would be of interest primarily as a source of terminology for indexing and not as a scheme for development of a hierarchical structure. Most of the items listed cover a specialized subject area. The exceptions, and probably the works of greatest relevance to future Videotex applications, are the Unesco Thesaurus, the New York Times Information Bank Thesaurus, the Canadian Newspaper Index and the Public Affairs Information Service Bulletin. The last two items are periodical reference sources, but a fairly standard vocabulary is used in each case. The Unesco Thesaurus is fairly unique for a thesaurus in its broad coverage of the areas of knowledge. The New York Times Information Bank Thesaurus is oriented to current events and consequently covers a very broad range of topics. This thesaurus should be considered seriously for any Videotex application. Subject terms used in the Canadian Newspaper Index also cover current events, but being restricted to use in a printed medium, are not as extensive as those in the Information Bank Thesaurus. They have the advantage, however, of covering topics unique to Canada. The Public Affairs Information Service Bulletin could prove to be awkward to use as an indexing tool, but its coverage of the broad range of topics that are implied in public affairs makes it worthy of mention.

Aitchison, Jean, comp. Unesco Thesaurus. 2 vols. New York: Unipub, 1977.

Order from publisher,
Unipub, A Xerox Publishing Co.,
P.O. Box 433, Murray Hill Sta.,
New York 10016

- (34) Excerpt: p. 1

Beck, C.; Dym, E.D.; and McKechnie, J.T., comp. Political Science Thesaurus. Washington, D.C.: American Political Science Association, 1975.

Order from APSA
1527 New HAMPSHIRE Avenue, N.W.
Washington, D.C. 20036

Bury, Richard L. Thesaurus of outdoor recreation terms. rev. ed. Washington, D.C.: Bureau of Outdoor Recreation, U.S. Department of the Interior, 1970. **

Canadian Newspaper Index. Toronto: Information Access, monthly
(The list of subject headings is available from the publisher)

ERIC Thesaurus. Thesaurus of ERIC descriptors. New York: CCM Information Corp., 1972.

Order from:

Macmillan Information
866 Third Ave., New York 10022

- (35) Greengrass, Alan R. "The Information Bank Thesaurus". In: The Information Age in Perspective. Proceedings of the 41st Annual Meeting of the American Society for Information Science, New York, N.Y., November 13-17, 1978. Vol: 15. Edited by Everett H. Brenner. White Plains, N.Y.: Knowledge Industry Publications, Inc., 1978. pp. 137 - 140.

New York Times Information Bank. Thesaurus: a guide for searching the Information Bank and for organizing, cataloging, indexing and searching collections of information on current events. Parsippany, N.J.: The Bank, 1977.

Order from:

New York Times Information Bank
1719A Route No. 10, Parsippany, N.J., 07054

Urbandoc/ a bibliographic information system. Technical Supplement/ general manual. New York: The Graduate Division, The City University of New York, 1971. **
(Thesaurus is appendix to the manual)

Viet, Jean. Cultural development thesaurus. Strasbourg: Council of Europe, 1976. **

----- Thesaurus for information processing in sociology. Paris; the Hague: Mouton, 1971.

Order from:

Mouton Publishers, a Division of Walter De Gruyter, Inc.
200 Sawmill River Rd., Hawthorne, N.Y. 10532

----- Thesaurus: mass communication. Paris: Maison des Science de l'homme, 1975. **

Wright, Keith. Urban action thesaurus. New York: CCM Information Corp., 1972. **

** Ordering information not available.

