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USER'S GUIDE TO THE SOLAR KWIC FILE

Timothy C. Diller, et al

System Development Corporation

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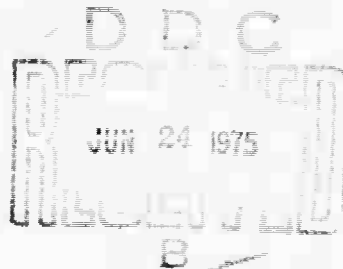
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USER'S GUIDE TO
THE SOLAR KWIC FILE

30 MAY 1975



TIMOTHY DILLER

FRANK HEATH

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ABSTRACT

This document contains a general explanation of the KWIC file of SOLAR (a Semantically-Oriented Lexical Archive). It is intended as an introduction and reference manual for the on-line user, the casual reader, or the data collector. The document indicates the design concepts, the resulting file structure, the intended file content, retrieval procedures, and data collection procedures. A complete list of SOLAR documentation is given in the introduction to this document.

FOREWORD

This document is one of a series provided by System Development Corporation as a guide to the SOLAR system. Users are encouraged to advise us by phone or in writing of errors, ambiguities, or other deficiencies and difficulties arising in the use of this document and/or the SOLAR system. Communicate with:

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1. INTRODUCTION

SOLAR OVERVIEW

This section serves as a common preface to each of the user's guides describing the SOLAR files. It outlines the goals of SOLAR and the relationship of each file to those goals. It ends with a list of the documents describing SOLAR.

SOLAR is intended to provide easy access to a large variety of semantic data pertaining to a selected set of English words. Data have been collected to date on about 1,000 SUP words, i.e., words found in the lexicons of the Speech Understanding Research groups being sponsored by ARPA.⁽¹⁾ Each of the eight principal SOLAR files contains semantic data of a different type. Two supplementary files facilitate use of the archive: a word index and a bibliography.⁽²⁾

(1) The file of semantic analyses consists of formal descriptions of word meanings, primarily those descriptions given in papers written by linguists, philosophers, and computer scientists. Whatever information the author presents on such topics as predicate-argument relations, semantic components, presuppositions, and/or entailment is abstracted. In addition, qualifications and informal explanations by the author are included as are criticisms of his description by other writers: and/or by us.

(1) Although the words for which data is currently being collected all come from the lexicons being used by the SUP projects at Carnegie-Mellon University, Bolt Berneik and Newman, and System Development Corporation, we are willing to extract and collect data on other word sets also.

(2) We wish to acknowledge John Olney's contributions to the archive: he was largely responsible for the original design of SOLAR as set forth in Miller and Olney (1973) and continues to be responsible for the preparation of integrative summaries of conceptual analyses.

(2) A second file provides a concise digest of the theoretical background of each semantic analysis. The author's theoretical orientation, his assumptions, and his notational conventions are discussed.

(3) Explanatory notes for the semantic components used in the semantic analyses are entered into a third file. These notes explain as precisely as possible the conceptual content each author evidently intends his component(s) to have. Included in the file are any comments on the author's use of components that the SOLAR builders have deemed appropriate.

(4) A file of conceptual analyses contains integrative summaries of the best analyses found in the recent literature of analytic philosophy and artificial intelligence for particular notions, primarily those coinciding with or underlying the semantic components entered in the third file.

(5) A collocational feature file contains, for SUR words, the definitions from Webster's Seventh New Collegiate Dictionary (W7) in which a subject label, a parenthetic phrase, a usage note, or a verbal illustration appears. Each of these elements supplies some indication of the words or word classes permissible in the immediate context of a given SUR word.

(6) A semantic field file⁽³⁾ will provide a series of displays showing most of the other words in the English vocabulary that stand in a morphological, definitional, synonymitive, antonymitive, or thesaural

⁽³⁾The structure of this file and procedures for creating it have been specified in detail; however, coding has not yet begun on the several programs needed.

relationship to a given word. Such relationships will be machine derived from the E7 transcripts, a partial transcript of Webster's New Dictionary of Synonyms, and a thesaurus transcript (hopefully the transcript of Roget's International Thesaurus being prepared by Sally Sodelow at the University of Kansas).

(7) A file of definitional expansions ^(*) will indicate the extent and nature of the semantic connectedness among words in a particular lexicon. For each word in a given lexicon, a display will be provided of all the words in that lexicon that can be reached by following E7 definitional links outward to two levels of remoteness from that word.

(8) A key-word-in-context ("KWIC") file will, when complete, contain representative contexts of a given word's occurrences in the million-word Brown Corpus, the 1.2 million-word corpus of E7 definitions, and dialogues collected by the speech understanding groups.

The first of the supplementary files is a word index, which lists all the words appearing in the speech understanding lexicons, the lexicons they appear in, the parts of speech given for each word in the lexicon together with their corresponding parts of speech in E7, and the types of SOLAR data available for each word.

A bibliography file provides citations to the technical documents in linguistics, philosophy, and computer science that are referenced in other SOLAR files or may be of interest to researchers in natural language processing.

(*)Although this file has not yet been produced, the programs needed to build it are close to final checkout.

SOLAR DOCUMENTATION

Archive Overviews

1. Diller, T., & J. Olney. (1973) "SOLAR (A Semantically-Oriented Lexical Archive)" SDC Document SP-3726/000/00.
2. Diller, T., & J. Olney. (1974) "SOLAR (A Semantically-Oriented Lexical Archive): Current Status and Plans" Computers and the Humanities 3:301-312.
3. Diller, T. & J. Olney. (forthcoming) "SOLAR: A Comprehensive Source of Semantic Lexical Data" American Journal of Computational Linguistics.

User's Guides

4. Bye, T., T. Diller, & J. Olney. (1975) "User's Guide to the SOLAR Semantic Analysis File" SDC Document TM-5292/001/00
5. Diller, T. (1974) "User's Guide to the SOLAR Bibliography File" SDC Document TM-5292/000/02
6. Diller, T. (in prep.) "User's Guide to the SOLAR Word Index" SDC Document TM-5292/009/00
7. Diller, T., & T. Bye. (1975) "User's Guide to the SOLAR Theoretical Backgrounds File" SDC Document TM-5292/002/00
8. Diller, T., T. Bye & J. Olney. (1975) "User's Guide to the SOLAR Semantic Component File" SDC Document TM-5292/003/00
9. Diller, T., & F. Heath. (1975) "User's Guide to the SOLAR KWIC File" SDC Document TM-5292/003/00
10. Diller, T., & F. Heath. (in prep.) "User's Guide to the SOLAR Collocational Feature File" SDC Document TM-5292/005/00
11. Diller, T., F. Heath, & J. Olney. (in prep.) "User's Guide to the SOLAR Semantic Field File" SDC Document TM-5292/006/00
12. Heath, F., T. Diller, & J. Olney. (in prep.) "User's Guide to the SOLAR Definitional Expansion File" SDC Document TM-5292/007/00
13. Olney, J., F. Delacruz, T. Diller, & N. Huzodlu. (in prep.) "User's Guide to the SOLAR Conceptual Analysis File" SDC Document TM-5292/004/00

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2. FILE DESIGN

In scholarly lexicography, the primary basis on which the meaning of a word is analyzed into separate senses is a balanced collection of contexts of actual occurrences of the word in many different types of writing. Since the companion SOLAR files provide information on only one, or at most, a few of the senses of a given word, the KWIC file adds a measure of generality which broadens the utility of the archive. By providing the user with representative samples of the constructions in which particular words appear, we assure him a better chance of settling upon a sense analysis for a particular lexical domain which is compatible with an extension of the domain, when that occurs.

To assure maximum generality while providing data specifically related to the ARPA SUR projects, we have included contexts extracted from both written and spoken sources. The Brown Corpus provides a well-balanced source of written contexts.⁽³⁾ The W7 definitions make a unique contribution because the occurrences of words in its definitions are contextually unspecialized to a far greater extent than those in the Brown Corpus or in any other sample of normal writing.⁽⁴⁾ Supplementing these general sources of written contexts are the transcripts of the spoken SUR protocols pertinent to the SNC and CMU projects.

(3)The Brown Corpus contains a million words of text, as extracted from 500 sources representing 15 genres of writing. It covers the same types of writing as the file of 10 million contexts used in preparing Webster's Unabridged. Details of the construction and contents of the Brown Corpus are to be found in Kucera and Francis (1967) and in the Manual of Information (1964).

(4)More than 1,200,000 contexts can be extracted from the W7 definitions; however, over a third of these consist of contexts of highly frequent function words.

Having such contexts of occurrence at his fingertips will benefit the archive user by supplementing his linguistic intuition as to details of the usage of a word, as in standard lexicographic practice.

The design of this file has been affected in several ways by our intention that it be directly accessible to researchers via the ARPA network. First, the file has been placed in a highly user-oriented data management system to assure that the time spent by users in learning the file structure and data management protocols will be minimal. Second, the length of centered word plus contexts was constrained to a single terminal output line to facilitate reading. Third, the number of lines of context per centered-word was limited to 100 (for the Brown Corpus and 27). No stop list was used, however, so contexts are included for all SUB words (including function words) which have a match in the Brown Corpus or the 27 definitions, as the case may be.

3. DEFINITION OF FIELDS:

There are 12 fields in which data can be entered. Each will be discussed in turn in regard to the type and format of the data allowed.

SOLAR Word:

The word for which contexts are entered (the centered word) is, for the Brown and EZ contexts, the canonical, uninflected SOLAR word as found in the companion word Index file. (All inflected forms appearing in the SUR lexicons are linked to their corresponding canonical form in that file.)

The words in the SUR protocols have no such inflectional limitation. Every word appearing in the protocols is included. Further, no limitation is placed on the number of contexts included. (The protocols do not exceed 200 sentences in length, so an excessive number of contexts is not a concern.)

SUR Domain:

To permit the ABPA users to qualify retrieval on the basis of the lexicons they are currently working with, we have entered here the name(s) of the SUR lexicons containing the centered word or one of its inflected forms. Each name is entered with a separate field identifier and is searchable via inverted indices. The list of names currently employed is as follows:(?)

(?)CMU refers to the Carnegie-Mellon University SUR project; BBN

AP (Small Associated Press Release--CMU)
APSYS (Large Associated Press Release--CMU)
CHESS (Chess Playing Lexicon--CMU)
CHT (Second Chess Playing Lexicon--CMU)
DESCAL (Desk Calculator Lexicon--CMU)
DOCTOR (Medical Lexicon--CMU)
PACFLEET (Warships Lexicon--SDC)
SMALLWORD (Core of Lunar Rocks Lexicon--BBN)
SUBS (Subset of Jane's Fighting Ships--SDC)
TRAVEL (Business Travel Lexicon--BBN)
VOCAB (Pump and Faucet Repair Lexicon--SRI)
WORDS (Expansion of SMALLWORD--BBN)

Additional lexicons can be added as requested by users.

Brown Sample:

The contexts extracted from the Brown Corpus are taken from 500 samples of text. This field identifies the sample, using the codes as given in the machine transcripts. For detailed information about the constitution and source of each sample, the reader should consult the Manual of Information (1964).

Brown Line Id:

Each context appearing in the Brown Corpus is identified as to its position within a sample by a line number. We have included that identifying four-digit number here.

Brown Context:

The centered word and its surrounding context are found here. As explained in section 5, DATA COLLECTION, this is a 63 character

refers to the Bolt Beranek and Newman SUP project; SDC refers to the SUP project at System Development Corporation; SRI refers to the Stanford Research Institute project currently providing direct support to the SDC SUP project.

substring of the 105 characters of context provided in the original transcripts.

SUB Protocol:

For those contexts extracted from the protocols collected by the SUB projects, we enter here the data by which the protocol is identified.

SUB Sentence ID:

The unique number assigned to each sentence in a given SUB protocol is included herein.

SUB Sentence Type:

Since protocols generally represent the interaction of a user with a (simulated) computer, it is useful to identify the pragmatics of a given context. This field allows a context substring to be tagged as coming from a user's interrogative, imperative, or declarative input, a user's parenthetic comment, the computer's response, or a monitor's feedback.

SUB Context:

The centered word and surrounding context are entered here. All contexts appearing in the protocol are entered; however, only 63 characters are permitted per context.

U7 Main Entry:

To facilitate manual access to a broader U7 context, we have

included the main entry word whose definition contains the centered word.

E7 Main Entry Id:

The hexagram number together with the sense and subsense letters and numbers of the definition that contains the centered word are given here.

E7 Context:

This field contains the centered word and its context as found within a particular sense definition. As with the other contexts, a maximum of 63 characters is permitted.

4. DATA RETRIEVAL

The information in the KWIC file is available in two modes: via on-line queries to the SOLAR data management system over the ARPA Network and by listings distributed by the SOLAR staff.

4.1 ON-LINE ACCESS

All SOLAR files reside in the SDC SOLAR data management system.^(*) Since the system is self-documenting and exceptionally user-oriented, our guidance here in the use of the system is quite general.

The SOLAR data management system resides within the CMS time-sharing system running on an IBM 370/145 at SDC. CMS is accessible through the ARPA Network via either TELNET or TIP connections.

(1) To connect to SDC CMS via a TIP, make sure your terminal is set to full duplex and type:

BT <SP> 0 <SP> L <CR> 'transmit on linefeed'

BL <SP> 9 <CR> 'log to host #9 (SDC)'

The response to you should be:

DPFH 'TIP says you are now connected'

SDC 370/145 TELNET 'SDC net msg'

VM-370 ONLINE 'SDC time-sharing msg'

. 'period is the login prompt'

(*)The SOLAR data management system has come into existence largely because of the selfless, diligent, and competent work of Roy Gates. Through his efforts the system was made compatible with the CMS time-sharing system and the initial compilations were accomplished. Dwight Harm also gave generously of his time and expertise.

At this point CMS is expecting you to login.

(2) To login, type: LOGIN SOLAR <CR>. SOLAR will then print some sign-on messages and take care of counting disk packs (if necessary). You will then be asked to sign our visitors log. The signal for your response throughout your interaction with SOLAR will be a hyphen (-) in column 1. Please wait for that prompt before typing. Terminal input may be either upper case, lower case, or a mixture.

(3) To obtain an introduction to the SOLAR DMS, ask for the new-user format when given that option. Or, type: "EXPLAIN SUMMARY" <CR> (with quotes). SOLAR will then give you a briefing on searching and printing procedures, command names, and program messages.

(4) To access the KWIC file, (2) type: "FILE KWIC" <CR>.

(5) To obtain an introduction to the KWIC file, type: "EXPLAIN DATABASE" <CR>. This will elicit the following table together with an explanation of the various categories of information.

<u>ABBREV</u>	<u>CATEGORY</u>	<u>SEARCHABLE</u>
WD	SOLAR WORD	Y
DD	SUB DOMAIN	Y
BS	BROWN SAMPLE	
BI	BROWN LINE ID	
BC	BROWN CONTEXT	
BP	SUR PROTOCOL	Y
SI	SUR SENTENCE ID	
ST	SUR SENTENCE TYPE	X
SC	SUR CONTEXT	
WE	W7 MAIN ENTRY	
WI	W7 MAIN ENTRY ID	
WC	W7 CONTEXT	

(6) To search for contexts of interest to you, type in the term for which you desire contexts. For example, type: analyze <CR> or

(2) The SOLAR DMS initially accesses the bibliographic citation file.

analy# (WD) <CR>. The search terms must be entered unpunctuated. The #-sign stands for an indeterminate string of characters. The category in parentheses limits the search to that single field.

A search can also be made of the non-indexed fields using the STRINGSEARCH facility. Type "EXPLAIN STRINGSEARCH" <CR> for details.

(7) To print data once contexts have been selected, you can use one of the following special print formats:

<u>COMMAND</u>	<u>FIELDS RETURNED</u>
"PRINT BROWN"	SOLAR Word and Brown Contexts
"PRINT SUR"	SOLAR Word and SUR Contexts
"PRINT W7"	SOLAR Word and W7 Contexts

It is also possible to tailor your print commands. Type "EXPLAIN PRINT" <CR> for details.

(8) To halt printout of data on your terminal, hit the break key once and wait for the SOLAR prompt (-). Then type: HT <CR> (halt typing). When prompted again, hit <CR> and SOLAR will ask for your next search statement.

(9) To switch to another data file, type: "FILE <FNAME>" <CR>. For example, "FILE COMPON" <CR>. To ascertain the files available, type: "FILES ?" <CR>.

(10) To quit your interaction with SOLAR, type: QUITIT <CR>. SOLAR will then automatically log you out.

4.2 COMPOSED LISTINGS

The contents of this file are being made available in printed form as well as on-line. (10) Users wishing to receive these listings should

(10) Not all users are expected to have access to the APPA Network

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request them from Tim Diller. The user is advised, however, that the on-line version is likely to be more current than the printouts, which will be produced only at intervals of significant accretion.

and some analyses may be considered unsuitable for terminal printout because of their length.

5. DATA COLLECTION

The ERIC file is being built totally under algorithmic control by programs that extract data from machine readable transcripts of the Brown Corpus,⁽¹¹⁾ of Webster's Seventh New Collegiate Dictionary,⁽¹²⁾ and of dialogs collected by the APRL Speech Understanding Research projects.

The included Brown Corpus contexts are but a small subset of those available in the original Corpus tapes. First, we extract contexts for only those words appearing in the SOLAR Word Index. Second, the length of each context is reduced from 105 characters to 63.⁽¹³⁾ Third, we extract only the first 100 contexts for a given word. For the 1100 most frequently occurring words, this results in some loss of generality since the samples from which the contexts are extracted most probably do not come from all the different genres of writing. (If this is determined to be a significant drawback, appropriate revision of our extraction program will be made.) With these limitations and a SOLAR word list of about 2500 terms, contexts have been entered from the Brown Corpus for 2164 words.

The 27 definition contexts have not yet been entered into the SOLAR data management system (P43). However, such contexts have been derived from the 27 transcripts by Olney's Semantic Foundations Project (cf.

(11)We wish to thank Gerald Public for providing us with a transcript of the Brown Corpus.

(12)The material in this file that is taken from Webster's Seventh New Collegiate Dictionary, copyright 1967 by G. & C. Merriam Company, publishers of Merriam-Webster dictionaries, is used by permission. All rights to such material are reserved by G. & C. Merriam Company.

(13)This is the largest number suitable to both terminal output and the data management system's data input format. The centered word of course remains centered in this reduction.

Olney and Ramsey (1972)). The reformatting of these contexts for input to the SOLAR DMS will be undertaken following a period of evaluation of the utility of the Brown contexts.

Four SUB protocols are currently in hand and being readied for inclusion in the archive. Two protocols were collected for the SDC SUB project by Barbara Dentsch of SRI. They consist of about 120 queries posed during an experiment at the Naval Postgraduate School in Monterey, California. A member of the faculty at the school simulated the computer using a copy of the SDC submarine data base taken from Jane's Fighting Ships. Two naval officers were assigned tasks that required them to fill out three charts and solve two problems, all requiring information about specifications and performance characteristics of submarines in the U.S., Soviet, and British fleets. One subject was a lieutenant with computer experience but no experience on submarines. The other was a lieutenant with several years experience on nuclear submarines and no computer background. These differences are reflected in the questions asked by the two subjects.

The third SDC protocol was based on the same task domain but was collected at SDC. The subject was knowledgeable in computers but unfamiliar with submarines.

The fourth protocol consists of 200 sentences collected by the CMU SUB project. This protocol differs from the others mainly in being simply a collection of sentences which could be posed to the CMU Associated Press Release data base. There is no continuity of thought from one question to the next or from an answer to the next question: i.e., there was no 'task' or 'goal' requiring more than a single sentence to resolve.

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6. REFERENCES

- Diller, W. and J. Olney. (1973) "SOLAR (A Semantically-Oriented Lexical Archive)" SDC Document SP-3726/000/00.
- Kucera, H. and W. Francis. (1967) Computational Analysis of Present-Day American English. Providence, R.I.: Brown University Press.
- Manual of Information. (1964) Providence, R.I.: Department of Linguistics, Brown University.
- Olney, J. and D. Ramsey. (1972) "From Machine-Readable Dictionaries to a Lexicon Tester: Progress, Plans, and an Offer" Computer Studies in the Humanities and Verbal Behavior 2.4:213-220.

7. SAMPLE ON-LINE INTERACTION

SS 1 /C: <SOLAR asks for first search statement or command>
 -"file kwic" <user chooses to access KWIC file>

YOU ARE NOW CONNECTED TO THE KWIC DATABASE.

SS 1 /C: <SOLAR asks for search statement or command>
 -get <user asks for entry having 'get' as searchable term>

ENTRIES (1) <SOLAR indicates there is one such entry>

SS 2 /C: <SOLAR asks for next search statement or command>
 -"print brown" <USER commands print of Brown contexts>

WD- GET
 BC- TION ABOVE 150,000,000 WOULD GET ONE ADDITIONAL POST FOR EACH A
 BC- DALLAS MAY GET TO HEAR A DEBATE ON HORS
 BC- ALLAS AND OTHER LARGE CITIES GET MONLY WHICH COTTON FELT COULD
 BC- CHERTY IT IS IMPOSSIBLE TO GET A FAIR TRAIL WHEN SOME OF THE
 BC- ND MADE A GENUINE ATTEMPT TO GET INFORMATION AND UNDERSTANDING
 BC- EP WITH THE (C)D ATTEMPT TO GET ALL THE ALLIED CARS BACK ON TH
 BC- JOSEPH NUGENT TO GET THE BENEFIT OF HIS VIEWS
 BC- USUAL HE MADE NO ATTEMPT TO GET IN TOUCH WITH CARMINE
 BC- AS NINETY-NINE MEMBERS WOULD GET TWO PROFESSIONAL POSTS SUCH A
 BC- EACH MEMBER WOULD GET ONE POST FOR EACH 10,000,000 P
 BC- ISSUE LEGISLATORS ALWAYS GET RESTLESS FOR A SPECIAL SESSION
 BC- NOW THE FULL AMOUNT UNTIL WE GET A FULL REPORT WAGNER SAID
 BC- PERATE SO FAR AS POSSIBLE TO GET THE CHILDREN TO WHERE THE PARE
 BC- SITION HE PLAYS AND YOU**ALL GET THE QUICK RESPONSE PLACE-
 BC- BACK ALL SEASON HE DID**AT GET INTO A SINGLE GAME
 BC- ECLARED ONCE YOU GET THE FEEL OF IT THERE**AS NOT
 BC- SOME OF THEM CAN**AT SEEM TO GET THE FEEL PRACTICE HELPS YOU
 BC- FIEL DBA!

-bt <after hitting the break key user tells CAS to halt typing>
 - <CAS asks for next input, user responds with <CR>>

SS 2 /C: <SOLAR asks for next search statement or command>
 -quitit <user asks to be logged out>