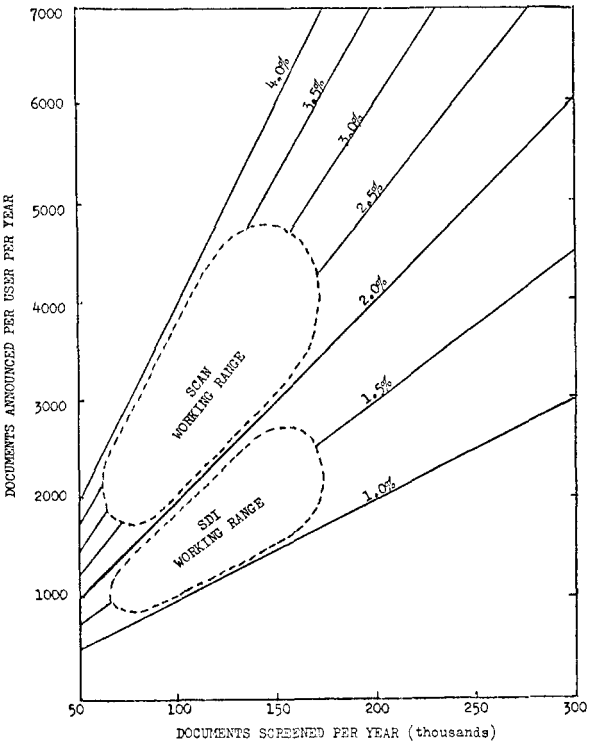

Figure 3. Working ranges of SCAN and SDI

unchanging ratios of the number of document announcements received by an average user to the number of documents introduced. Where the annual document input exceeds the 150,000 range, there are indications that initial screening or separation of input can be performed advantageously by techniques other than those described here.

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(6) Wente, V. A., and Young, G. A., "NASA SDI Program," Paper presented at 1965 Congress, International Federation for Documentation (FID), Washington, D.C., October 10–15, 1965.

(7) Holzbauer, F.W., and Parker, E.K., "Selective Information Dissemination by Computer-Based Subject Category," *Proceedings*, 29th Annual Meeting, American Documentation Institute, Santa Monica, Calif., October 3–7, 1966.

†The reports cited in references 2-5, may be purchased from the Clearinghouse for Federal Scientific and Technical Information, Springfield, Virginia.

ISI's Experiences with ASCA—A Selective Dissemination System*

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ASCA (Automatic Subject Citation Alert) is a commercially available SDI system covering the journal literature. The repertoire of questions which ASCA can utilize includes cited references, words from titles, authors, organizations, etc., and allows for logical combinations of these questions. This paper discusses differences and similarities between "citations" and "words" in retrieving and disseminating information. The problem of user-system interaction is explored, and some techniques for developing effective interest profiles are described. Although ASCA is a multi-disciplinary system, examples from fields like synthetic chemistry and biochemistry are provided.

During the past three years, the Institute for Scientific Information has been testing and operating the first large-scale selective dissemination system commercially available to individual scientists. During this time, researchers in almost every discipline have been utilizing the *ASCA* (Automatic Subject Citation Alert) system. More than 500 scientists have been involved in the tests of *ASCA* files that cover approximately 300,000 current articles each year, requiring about 10 million indexing terms.

Many systems for the selective dissemination of information (SDI) have been reported. Most of these systems are designed to provide information to individuals in

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specific large organizations like IBM, NASA, etc., which ordinarily already possess large-scale computers. For this reason, until now most academic, industrial, and governmental scientists and administrators who could benefit from SDI systems have not. *ASCA* has changed that situation and puts SDI at the disposal of anyone in large or small organizations.

ASCA has substantial coverage of chemistry and allied fields and has much to offer chemists who want to "keep up" with the literature. Of the 1600 journals covered by *ASCA*, perhaps the largest segment, beside physics and biomedicine, deals predominantly with chemistry.

Each journal covered is completely indexed as it is ISI's policy to cover journals comprehensively. Selective segmentation of journals or parts of journals into *a priori* categories, as is done in most conventional discipline-oriented systems, usually results in loss of information for the user. One of the significant advantages of the *ASCA* multidisciplinary approach is that it integrates the literature of seemingly diverse disciplines. Rapid technological advances in many cases involve mixtures of disciplines. *ASCA* enables the scientist to be aware of and take advantage of this cross fertilization.

In 1965 ISI launched its *ASCA* system (*ASCA* I). For the past two years we have had operating experience with *ASCA* I, *ASCA* II, and now *ASCA* III. The main differences between each succeeding generation of systems have been (1) new searching capabilities, (2) lower costs, and (3) added conveniences for the user. Simultaneously, journal coverage has been rapidly expanded.

ISI publishes the *Science Citation Index (1)*, which covers about 1600 journals, including most of the significant chemical journals of the world. The input to the *ASCA* system is exactly the same as the input to the *Science Citation Index (SCI)*. However, there are significant differences in the manipulations and outputs. For *ASCA*, output is a series of individual weekly reports of data selected on any of a vast repertoire of indexing criteria. For *SCI*, the output is the camera-ready copy of the large alphabetized Citation, Source, Corporate, and Permuterm Indexes.

ASCA was developed after 10 years of research on a retrieval system called "citation indexing" (2). The citation indexing method of retrieval of subject matter is based on the fundamental idea that when a scientist cites an earlier work, he specifies a conceptual—that is, subject—relationship between the two papers. In brief, he indexes his paper by use of citation terms. Later, when the user of a citation index or *ASCA* expresses his subject interest in citations (cited references) rather than words, the semantic problems frequently associated with changing nomenclatures or complex descriptors are avoided completely.

In all SDI systems it is necessary for the user to construct a "profile" of interests (3). He must "ask" the system what he is interested in. The computer, in turn, will "answer" the user by stating which current articles have appeared that should be of interest. The computer does this by comparing the user's profile with the attributes of the individual source documents.

In the *ASCA* system, the user has several advantages not found in other SDI systems (4, 5). He can construct his profile in many different ways and can use, among others, citation and/or word profiles in building his interest profile.

As examples, questions to the *ASCA* system can include requests for articles which:

1. contain in their titles any specific words, initial parts of words, or phrases, either alone or in any conceivable combinations.
2. are written by a given author.
3. describe work done at a given organization.
4. are published in a given journal.
5. cite any given paper, book, thesis, patent, etc.
6. cite a given first author.
7. conform with any combinations of the above.

Each week the newly published literature of science and technology is screened by *ASCA* and matched against each individual profile submitted by each scientist. To get an idea of the magnitude and complexity of the *ASCA* system, consider that in an average week, the computer examines about 6000 newly published items characterized in detail by some 180,000 indexing terms, including among others 60,000 cited references, 68,000 cited and publishing authors, 37,000 keywords in titles, and countless thousands of word stems, word phrases, and combinations thereof.

An important factor in the success of any SDI system is that it must allow the user to communicate with the system readily. This is true of *ASCA*. Users are provided periodically with cumulated statistical tabulations of their weekly *ASCA* reports. The user can add to, delete from, or reshape his profile on a weekly basis. This interaction between man and machine enables *ASCA* not only to be efficient, but constantly self-correcting.

Another factor which affects the success of an SDI system is the ease of access to the documents that are retrieved—that is, listed in the weekly reports. The *ASCA* subscriber can receive, together with his weekly *ASCA* report, tear sheets of articles listed on his report. This is called *ASCA*matic service and is purely optional. Alternately, the user may order any article on his *ASCA* report by using ISI's Original Article Tear Sheet (OATS) service. The specified tear sheets will be mailed within 24 hours of receipt of the "Return" copy of his *ASCA* report. ISI's unique OATS library consists of multiple copies of journals from which articles are literally torn—hence, the name tear sheets. Tear sheets of all but the longest articles are obtained quickly for $2.00 per article.

ASCA computer reports are sent by first class or air mail each week. Even if the literature does not provide any "hits" in a particular week, the subscriber still receives a report assuring him that the computer file was searched but that no pertinent items were found that answered any of the questions in his profile.

The frequency of *ASCA* reports makes it possible for any subscriber to read his report in a matter of minutes, an important factor to the busy scientist. The number of "hits" will vary from week to week and from interest to interest. Each *ASCA* report is quite individualized. Even two people working on similar projects generally have specific approaches which may differ considerably.

While words are inherently ambiguous in any system, and especially in so-called thesaurus systems, citations provide a means for defining subject interests relatively free of ambiguity (6). An example which illustrates the advantages of citation indexing over word indexing is the

topic of "Chemical Evolution" ("Origin of Life"). In this instance, there are practically no existing terms which will permit the scientist to construct an adequate word profile. Nevertheless, an average of half a dozen pertinent papers are found each week through the use of key cited references and authors.

There are other subjects, however, for which the user's requirements can be satisfied better through a word profile. This becomes apparent in fields where the terminology is unambiguous, free of inadvertent homographs, and where this terminology is consistently used in titles to identify the main theme of the article. The word "laser" is an example of relatively "clean" terminology. Words also can be used to advantage in fields where there are poor bibliographic practices or where there is a tendency to use small bibliographies or a diffuse bibliographic heritage. The field of engineering illustrates an area where references are not presently used as much as they might be. "Communication systems" illustrates a topic which might be difficult to specify in a list of cited references.

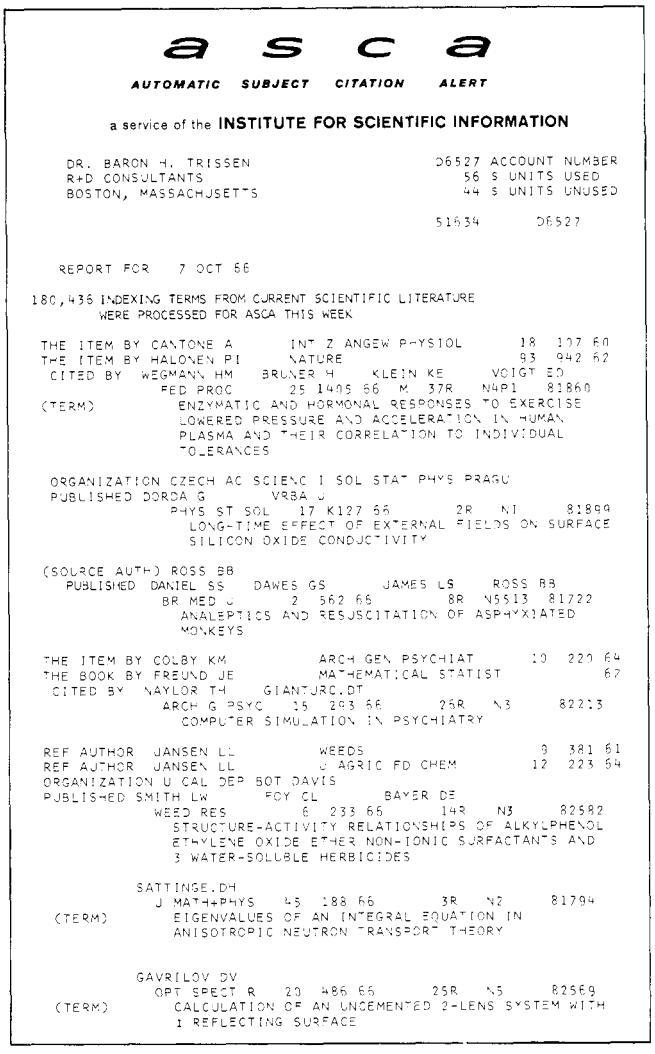
In our experience, one of the most exciting aspects of using profile terms such as "communication," "reading," or "creativity" is serendipitous "fallout" which is, in fact, inseparable from "noise." Users frequently find those things "interesting" which indexers would have ruled out as being "not relevant." In practice, it is all but impossible for an indexer to determine on an *a priori* basis all articles which prove "relevant" to the highly specific and subjective requirements of a particular user at a later time. This is especially true when the indexer is an intermediary applying either restricted *or* unrestricted vocabulary to an article as in the *Index Chemicus* or *Current Contents, Chemical Sciences*. It is also true for the original author when he "indexes" his paper by the title he chooses and by the references he cites.

Keep in mind that it is not always easy to ascertain what is irrelevant. Two different users may react differently to the same information. Some readers are often glad to see articles which other persons might consider irrelevant.

In the sense that the natural language expressions of authors form the basis of the word selection procedure in *ASCA*, it is a natural language system. In contrast, systems such as MEDLARS are based on artificial "unnatural" language—that is, subject heading authority lists or thesauri applied by indexers (*7*). Each of these approaches has advantages and disadvantages, but it should be stressed that in the *ASCA* system, word profiles are used to augment, not to replace, the unique means of access to the literature through citation indexing.

Figure 1 is a composite *ASCA* report illustrating answers to various types of questions. To illustrate the *ASCA* service by actual example, the profile for an industrial chemist doing research on "dimethylsulfoxide" is shown in Figure 2. The profile contains key papers on this topic, as well as the word terms "DMSO" and "dimethylsulfoxide." Figure 3 is a partial list of selected items to which the researcher was alerted during the past year. The items selected illustrate "hits" based on cited references and/or the terms "DMSO," etc.

ISI began the *ASCA* service after having had considerable experience with the publication of citation indexes. The 1965 version of *ASCA* is now designated as *ASCA* I. It was limited to the extent that the major type of question that could be entered in the system hinged upon the formulation of a list of "starting references" or known published works of interest. Thus, in the *ASCA* I system, having provided a list of key references in his field, a scientist would be alerted to all subsequent current papers that cited any one or more of the papers in his starting bibliography (profile). A generic form of the starting reference is the so-called "Cited Author Question," in which the scientist is alerted to any paper which has cited any of the papers ever written by a given first author.



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DR. BARON H. TRISSEN
R+D CONSULTANTS
BOSTON, MASSACHUSETTS

D6527 ACCOUNT NUMBER
56 $ UNITS USED
44 $ UNITS UNUSED

51634 D6527

REPORT FOR 7 OCT 66

180,436 INDEXING TERMS FROM CURRENT SCIENTIFIC LITERATURE
WERE PROCESSED FOR ASCA THIS WEEK

THE ITEM BY CANTONE A INT Z ANGEW PHYSIOL 18 107 60
THE ITEM BY HALONEN PI NATURE 93 942 62
CITED BY WEGMANN HM BRUNER H KLEIN KE VOIGT ED
FED PROC 25 1495 66 M 37R N4P1 81860
(TERM) ENZYMATIC AND HORMONAL RESPONSES TO EXERCISE LOWERED PRESSURE AND ACCELERATION IN HUMAN PLASMA AND THEIR CORRELATION TO INDIVIDUAL TOLERANCES

ORGANIZATION CZECH AC SCIENC I SOL STAT PHYS PRAGU
PUBLISHED DORDA G VRBA J
PHYS ST SOL 17 K127 66 2R N1 81899
LONG-TIME EFFECT OF EXTERNAL FIELDS ON SURFACE SILICON OXIDE CONDUCTIVITY

(SOURCE AUTH) ROSS BB
PUBLISHED DANIEL SS DAWES GS JAMES LS ROSS BB
BR MED J 2 562 66 8R N5513 81722
ANALEPTICS AND RESUSCITATION OF ASPHYXIATED MONKEYS

THE ITEM BY COLBY KM ARCH GEN PSYCHIAT 10 220 64
THE BOOK BY FREUND JE MATHEMATICAL STATIST 67
CITED BY NAYLOR TH GIANTURC.DT
ARCH G PSYC 15 283 66 25R N3 82213
COMPUTER SIMULATION IN PSYCHIATRY

REF AUTHOR JANSEN LL WEEDS 9 381 61
REF AUTHOR JANSEN LL J AGRIC FD CHEM 12 223 64
ORGANIZATION U CAL DEP BOT DAVIS
PUBLISHED SMITH LW FOY CL BAYER DE
WEED RES 6 233 66 14R N3 82582
STRUCTURE-ACTIVITY RELATIONSHIPS OF ALKYLPHENOL ETHYLENE OXIDE ETHER NON-IONIC SURFACTANTS AND 3 WATER-SOLUBLE HERBICIDES

SATTINGE.DH
J MATH+PHYS 45 188 66 3R N2 81794
(TERM) EIGENVALUES OF AN INTEGRAL EQUATION IN ANISOTROPIC NEUTRON TRANSPORT THEORY

GAVRILOV DV
OPT SPECT R 20 486 66 25R N5 82569
(TERM) CALCULATION OF AN UNCEMENTED 2-LENS SYSTEM WITH 1 REFLECTING SURFACE

Figure 1. A composite ASCA report.

After considerable experience with *ASCA* I, ISI made a number of modifications in the system and increased the versatility in what we now designate as *ASCA* II. In this stage of its development, source author questions, organization questions, patent classification, and patent assignee questions were introduced, adding considerable flexibility to the system. A "Source Author Question" serves to identify current papers published by a given individual no matter where his name appears in the by-line and regardless of what it cites or doesn't cite. Thus, if you know that a particular scientist is regularly working in a field of interest, it stands to reason that papers

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325 Chestnut St Philadelphia Pa 19106 USA

ASCA III Account No. D6527
ISI Invoice No. 52547
Name Dr. S. Cuesta

ASCA® III PROFILE ENTRY FORM

	LEAVE BLANK	NAME & INITIALS of cited first author, or other TERM	CITED PUBLICATION, or (CLASS), for other terms	VOLUME or (TYPE OF USE)	CITED ITEM'S FIRST PAGE	CITED ITEM'S LAST PAGE	YEAR	ASCA III DOLLAR UNITS	
01		AMONOO-NEIZA, E.H.	J CHEM SOC		6250		1965	2	
02		AUGDAHL, E.	ACTA CHEM SCAND	18	18		1964	2	
03		CAIRNS, T.	SPECTROCHIM ACTA	20	31		1964	2	
04		GRIFFIN, W.	MONATSH CHEM	93	215		1962	2	
05		KINGSBURY, C.A.	J ORG CHEM	29	3262		1964	2	
06		MURTO, J.	SUOMEN KEMISTILEHTI	B34	92		1961	2	
07		MURTO, J.	SUOMEN KEMISTILEHTI	B37	177		1964	2	
08		PARKER, A.J.	QUART REV	16	163		1962	2	
09		TOMMILA, E.	ACTA CHEM SCAND	17	1947		1963	2	
10		TOMMILA, E.	ACTA CHEM SCAND	17	1957		1963	2	
11		WOLFORD, R.K.	J PHYS CHEM	68	3392		1964	2	
12		GUTMANN, V.	(CITED AUTHOR)					6	
13		VANBINST, G.	(SOURCE AUTHOR)					4	
14		MEDICAL RESEARCH LABS EDGEWOOD ARSENAL, MD.	(ORGANIZATION)					10	
15		DMSO		Type 1				6	
16		DIMETHYL SULFOX/		"				6	
17		DIMETHYL SULPHOX/		"				6	
18		DIMETHYLSULFOX/		"				6	
19		DIMETHYLSULPHOX/		"				6	
20		TOTAL $ UNITS						72	
21									
22									
23									
24									
25									

Figure 2. ASCA profile on dimethylsulfoxide.

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DR. S. CUESTA D6527 Account Number
A-B-C CHEMICAL COMPANY 72 $ Units Used
COUNTERPANE, PENNSYLVANIA 28 $ Units Remaining

REPORT FOR 30 DEC 1966

180,625 INDEXING TERMS FROM CURRENT SCIENTIFIC LITERATURE
WERE PROCESSED FOR ASCA THIS WEEK

THE ITEM BY KINGSBURY CA J ORG CHEM 29 3262 64
THE ITEM BY MURTO J SUOMEN KEMISTILEHTI B 34 92 61
THE ITEM BY MURTO J SUOMEN KEMISTILEHTI B 37 177 64
THE ITEM BY TOMMILA E ACTA CHEM SCAND 17 1957 63
THE ITEM BY WOLFORD RK J PHYS CHEM 68 3392 64
CITED BY MURTO J VIITALA A 20R N7/8 83567
SUOM KEMIST 39 138 66
NUCLEOPHILIC REACTIVITY .14. KINETICS OF
DECOMPOSITION OF PICRYLIC I, I-DIETHOXY
(TERM) MEISENHEIMER COMPOUND - INFLUENCE OF SOLVENT
(WATER-DIMETHYL SULPHOXIDE MIXTURES) AND PRESSURE

THE ITEM BY PARKER AJ QUART REV 16 163 62
THE ITEM BY TOMMILA E ACTA CHEM SCAND 17 1947 63
CITED BY VIRTANEN PO
SUOM KEMIST 39 115 66 46R N7/8 83567
VAPOUR PRESSURE AND ACTIVITY OF ETHYLENE OXIDE
DISSOLVED IN VARIOUS WATER-ORGANIC SOLVENT
MIXTURES . KINETICS OF UNCATALYSED HYDROLYSIS
OF ETHYLENE OXIDE

CITED AUTH GUTMANN V MONATSH CHEM 93 212 62
CITED BY JONES JL FRITSCHE HA
J ELEC CHEM 12 334 66 24R N4 83608
(TERM) POTENTIAL SWEEP CHRONOAMPEROMETRY IN DIMETHYL
SULFOXIDE AT HANGING MERCURY DROP ELECTRODE

SOURCE AUTH VANBINST G
GRAMSTAD T VANBINST G
SPECTROCH A 22 1681 66 16R N10 83466
STUDIES OF HYDROGEN BONDING .16. COMPLEXING OF
PENTAFLUOROPHENOL WITH TRIPHENYLPHOSPHINE OXIDE

ORGANIZATION MED RES LABS EDGEWOOD ARSENAL
WORTHLEY EG SCHOTT CD
LLOYDIA 29 123 66 30R N2 83490
PHARMACOTOXIC EVALUATION OF 9 VEHICLES
ADMINISTERED INTRAPERITONEALLY TO MICE

Figure 3. Part of weekly ASCA report on dimethylsulfoxide.

which he publishes will probably be pertinent to your interests.

ASCA II enabled users to enter an "Organization" question so they could receive weekly reports on all publications emanating from a particular industrial, academic, or governmental organization. One can understand why a given chemical company might like to be informed regularly of all papers published by scientists affiliated with a given competitor. But the "Organization" question also is used to monitor the publications of one's own organization or to foster the exchange of information between academic institutions and the industrial firms in the area.

As in all SDI systems, *ASCA* I and II, while providing a unique means of access to literature through citation indexing, demanded of users a form of self-discipline, in framing questions, to which they were not accustomed. In traditional searching systems, where the chemist is directly involved in the searching, this rigor is not required. Furthermore, as SDI reports are quite selective, the user is afforded less opportunity to browse than when using *Current Contents* or the indexes to *Chemical Abstracts* or *Index Chemicus*. Consequently, the searching process of an SDI system must be "programmed" carefully by the user, and provision must be made to implement changes as needed. Whether the indexing methodology employed is citation indexing, thesaurus-controlled indexing, title indexing, etc., the key element in the success of the SDI system is the perceptiveness with which the profile is constructed and adjusted.

The introduction of *ASCA* III in late 1966, whereby "Cited Reference," "Cited Author," "Source Author," and "Organization" questions were *augmented* by "word profiles" did not alter this basic requirement. Indeed, the discipline required on the part of the user in constructing word profiles may be even more rigorous in some cases. "Cited Reference" questions can frequently make up, through redundancy, what is difficult or impossible to resolve when working with the innate ambiguity of natural language.

In *ASCA* III, we have an extended hybrid system in which it is possible to employ citation, author, organization, journal, and word profiles. All of these may be searched in a variety of combinations that will be illustrated later.

With *ASCA* III a subscriber can readily alter his profile by additions or deletions—and in most cases without charge. He now can do this on a weekly basis. Twice during each subscription period, he is sent a form which he can use at any time to make unlimited deletions from his profile and which will be done free of charge provided he uses the forms provided. This flexibility is necessary because no one is able to anticipate all possible useful terms, and furthermore, interests change.

In a paper presented two years ago in Syracuse (*8*), I provided a rather lengthy comparison between citation indexing and word indexing. It is not possible to elaborate in detail here on the many differences and similarities between these two types of indexing; however, there are some general comments which must be made: In one review of an early *Science Citation Index*, a British scientist (*9*) claimed that, given comparable financial support one could, through traditional indexing methods, produce a word index that would be equally as effective as a citation

index in retrieving information. He tacitly assumed that every concept which the mind of man can conceive is reducible to some simple set of indexing words.

Chemists know how difficult it can be to express structures, reaction mechanisms, mathematical equations, etc. in words. Ultimately, most concepts, if researched long enough, are clarified so that they are more amenable to expression in natural terms; but, particularly in chemistry, we are frequently dealing with concepts which cannot be easily described. That many chemists deal frequently with chemical compounds tends to obscure the fact that they and other chemists also deal with less easily labeled phenomena. Thus, benzene, carbon tetrachloride, or even some complex polymer can be stated in seemingly unambiguous terms through a chemical name. But in the early stages of work with naturally occurring substances, this is not possible. Similarly, chemists try to understand reaction mechanisms, but clearly there are many chemical states which cannot be reduced easily to verbal tags and remain, even after they have been elucidated, difficult to reduce to linear linguistic expressions. That is probably why a word-oriented index system like *Chemical Abstracts Index* cannot effectively cope with indexing reaction mechanisms or similar concepts.

However, if one wishes to find literature in which a particular reaction mechanism has been discussed, it is relatively easy to do so *via* a citation index. Similarly, if a given chemist wants to know of all currently published papers in which that reaction mechanism is discussed, *ASCA* can provide him with weekly reports of such information by telling him all papers that have cited the first paper, or one of the other papers that the chemist might be familiar with which were concerned with this reaction mechanism.

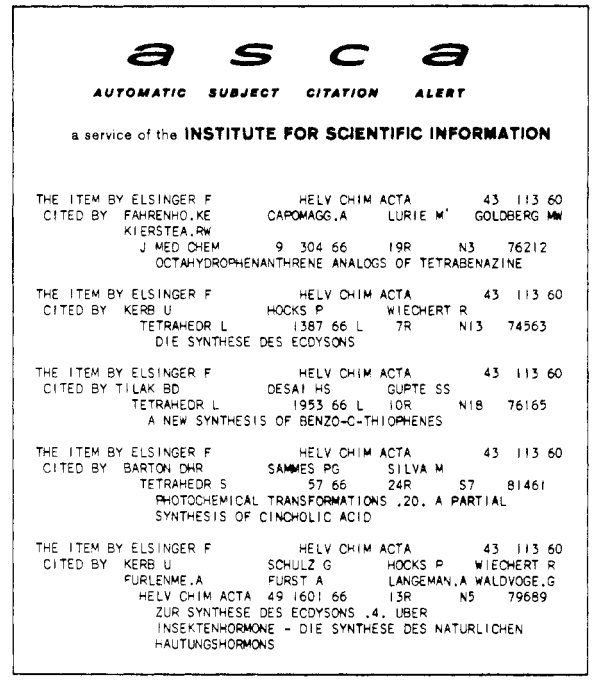
This is illustrated in a search of the *Science Citation Index* conducted by a British organic chemist who was interested in determining literature published since 1960 concerning the "hydrolysis of hindered esters by lithium halides in pyridine" (*10*). In this search, the starting reference was a paper on the Eschenmoser hydrolysis.

Figure 4 shows the list of papers that would have been sent to an *ASCA* subscriber in 1966 interested in following this literature. Figure 5 lists the papers retrieved from the *Science Citation Indexes* prior to 1966.

"Chemical Evolution" was mentioned earlier as another example of a difficult-to-define chemical topic. There is, as yet, no adequate list of terms that would enable even the most versatile chemist to determine, in an *a priori* fashion, which current papers should be sent to a chemist who is interested in all aspects of this topic. This is illustrated in Figure 6, which shows a number of appropriate titles sent to a scientist interested in the topic of "Chemical Evolution." It is evident that the titles of the papers would suggest the notion of Chemical Evolution only to the sophisticated.

Thus, our experience with *ASCA* confirms that there are many fields or topics for which it is difficult, if not impossible, to create word profiles that will satisfy adequately the needs of the requester, regardless of whether the indexing system involved is based on a selection of words from titles, abstracts, or even complete texts.

On the other hand, again particularly in the field of chemistry, there are examples and reasons why citation



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THE ITEM BY ELSINGER F — HELV CHIM ACTA — 43 113 60
CITED BY FAHRENHO,KE — CAPOMAGG,A — LURIE M' — GOLDBERG MW
KIERSTEA,RW
J MED CHEM — 9 304 66 — 19R — N3 — 76212
OCTAHYDROPHENANTHRENE ANALOGS OF TETRABENAZINE

THE ITEM BY ELSINGER F — HELV CHIM ACTA — 43 113 60
CITED BY KERB U — HOCKS P — WIECHERT R
TETRAHEDR L — 1387 66 L — 7R — N13 — 74563
DIE SYNTHESE DES ECDYSONS

THE ITEM BY ELSINGER F — HELV CHIM ACTA — 43 113 60
CITED BY TILAK BD — DESAI HS — GUPTE SS
TETRAHEDR L — 1953 66 L — 10R — N18 — 76165
A NEW SYNTHESIS OF BENZO-C-THIOPHENES

THE ITEM BY ELSINGER F — HELV CHIM ACTA — 43 113 60
CITED BY BARTON DHR — SAMMES PG — SILVA M
TETRAHEDR S — 57 66 — 24R — S7 — 81461
PHOTOCHEMICAL TRANSFORMATIONS .20. A PARTIAL SYNTHESIS OF CINCHOLIC ACID

THE ITEM BY ELSINGER F — HELV CHIM ACTA — 43 113 60
CITED BY KERB U — SCHULZ G — HOCKS P — WIECHERT R
FURLENME,A — FURST A — LANGEMAN,A — WALDVOGE,G
HELV CHIM ACTA 49 1601 66 — 13R — N5 — 79689
ZUR SYNTHESE DES ECDYSONS .4. UBER INSEKTENHORMONE - DIE SYNTHESE DES NATURLICHEN HAUTUNGSHORMONS

Figure 4. 1966 articles retrieved by ASCA concerning hydrolysis of hindered esters by lithium halides in pyridine (Eschenmoser hydrolysis).

1961 PAPERS

SCHREIBER J — LEIMGRUBER W — PESARO M — SCHUDEL P — THRELFALL T — ESCHENMOSER A
HELV CHIM ACTA * 44 540 61
SYNTHESE DES COLCHICINS

TASCHNER E — BIERNAT JF — RZESZOTARSKA B — WASIELEWSKI C
ANN CHEM — 646 134 61
NEW ESTERIFICATION METHODS IN PEPTIDE CHEMISTRY, V. PREPARATION OF TERT.-BUTYLESTERS OF N-ACYLATED AMINOACIDS WITH THE USE OF PHOSPHORUS OXYCHLORIDE

THOMAS AF
TETRAHEDRON — 15 212 61
THE TRITERPENES OF COMMIPHORA-II. THE STRUCTURES OF COMMIC ACID C AND COMMIC ACID D

1964 PAPERS

COOKSON RC — DANCE J — HUDEC J
J CHEM SOC — 5416 64 — 21R — DEC — 60158
STEREOCHEMISTRY OF 2,6-ADDITION OF DIENOPHILES TO BICYCLO(2,2,1)HEPTADIENE

DAY AC
J CHEM SOC — 3001 64 — 25R — SEP — 57416
TOTAL SYNTHESIS OF (+)-14-ISOPROPYLPODOCARPA-8, 11, 13-TRIENE-13, 16-DIOL [(+)-16-HYDROXYTOTAROL] & (+)-MACROPHYLLIC ACID

LINDE H
HELV CHIM A — 47 1234 64 — 11R — N5 — 55269
EIN NEUES DITERPEN AUS SALIVA OFFICINALIS L & EINE NOTIZ ZUR KONSTITUTION VON PIKROSALVIN

LEONARD NJ — WILSON GE
J AM CHEM S — 86 5307 64 — 60R — N23 — 59429
SYNTHESIS & OXIDATIVE REARRANGEMENT OF SOME 1,4-THIAZEPINES RELATED TO PENICILLINS

SHEEHAN JC — DAVES GD
J ORG CHEM — 29 2006 64 — 44R — N7 — 55324
FACILE ALKYL-OXYGEN ESTER CLEAVAGE

1965 PAPERS

DEAN PDG
J CHEM SOC — 6655 65 — N — 3R — NOV — 70199
HALOGENOLYSIS OF METHYL GLYCYRRHETATE WITH LITHIUM IODIDE-DIMETHYLFORMAMIDE

EASTMAN RH — TAMARIBU,K
J ORG CHEM — 30 1671 65 — N — 9R — N5 — 64327
INDUCTIVE EFFECTS ON POSITION OF A RING-CHAIN EQUILIBRIUM

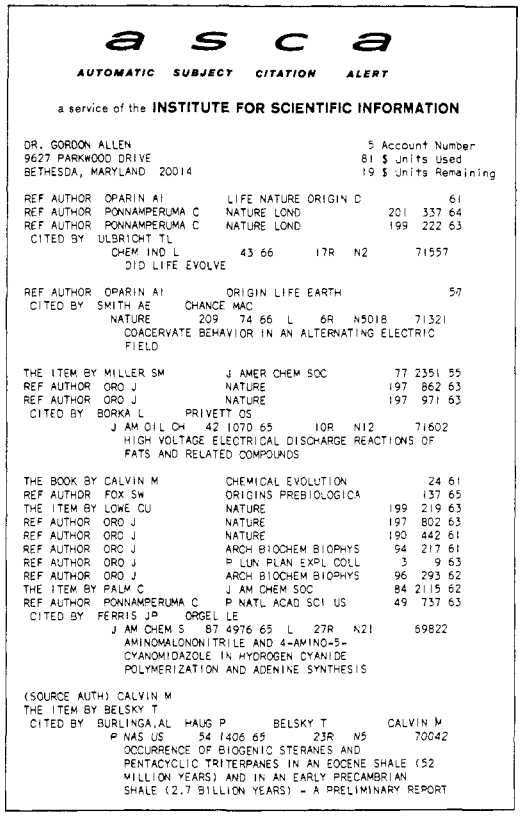
HERZ W — WAHLBORG HJ
J ORG CHEM — 30 1881 65 — 26R — N6 — 65354
RESIN ACIDS .3. 9-HYDROXYABIETIC ACID AND ITS TRANSFORMATION PRODUCTS

HOUSE HO — FRANK GA
J ORG CHEM — 30 2948 65 — 49R — N9 — 68251
EFFECT OF SOLVENT CHANGE ON FAVORSKII REARRANGEMENT OF ALPHA-HALO KETONES

SNATZKE G — ZANATI G
ANN CHEM — 688 62 65 — 43R — APR — 64412
VERBINDUNGEN MIT DREI RINGEN UBER EINER C-C- BINDUNG .1. TRICYCLO 4.4.3.0 TRIDECANON-(11) TRICYCLO 4.4.4.0 TETRADECANON-(12) UND -DION-(2,3)

VAUGHAN WR — BERNSTEIN SC — LORBER ME
J ORG CHEM — 30 1790 65 — 27R — N6 — 65354
REFORMATSKY REACTION .1. ZINC AND ETHYL ALPHA-BROMOISOBUTYRATE

Figure 5. Papers published prior to 1966 on the hydrolysis of hindered esters by lithium halides in pyridine (Eschenmoser hydrolysis) retrieved through the *Science Citation Index*.



a s c a

AUTOMATIC SUBJECT CITATION ALERT

a service of the **INSTITUTE FOR SCIENTIFIC INFORMATION**

DR. GORDON ALLEN — 5 Account Number
9627 PARKWOOD DRIVE — 81 $ Units Used
BETHESDA, MARYLAND 20014 — 19 $ Units Remaining

REF AUTHOR OPARIN AI — LIFE NATURE ORIGIN D — 61
REF AUTHOR PONNAMPERUMA C — NATURE LOND — 201 337 64
REF AUTHOR PONNAMPERUMA C — NATURE LOND — 199 222 63
CITED BY ULBRICHT TL
CHEM IND L — 43 66 — 17R N2 — 71557
DID LIFE EVOLVE

REF AUTHOR OPARIN AI — ORIGIN LIFE EARTH — 57
CITED BY SMITH AE — CHANCE MAC
NATURE — 209 74 66 L 6R N5018 — 71321
COACERVATE BEHAVIOR IN AN ALTERNATING ELECTRIC FIELD

THE ITEM BY MILLER SM — J AMER CHEM SOC — 77 2351 55
REF AUTHOR ORO J — NATURE — 197 862 63
REF AUTHOR ORO J — NATURE — 197 971 63
CITED BY BORKA L — PRIVETT OS
J AM OIL CH — 42 1070 65 — 10R N12 — 71602
HIGH VOLTAGE ELECTRICAL DISCHARGE REACTIONS OF FATS AND RELATED COMPOUNDS

THE BOOK BY CALVIN M — CHEMICAL EVOLUTION — 24 61
REF AUTHOR FOX SW — ORIGINS PREBIOLOGICA — 137 65
THE ITEM BY LOWE CU — NATURE — 199 219 63
REF AUTHOR ORO J — NATURE — 197 802 63
REF AUTHOR ORO J — NATURE — 190 442 61
REF AUTHOR ORO J — ARCH BIOCHEM BIOPHYS — 94 217 61
REF AUTHOR ORO J — P LUN PLAN EXPL COLL — 3 9 63
REF AUTHOR ORO J — ARCH BIOCHEM BIOPHYS — 96 293 62
THE ITEM BY PALM C — J AM CHEM SOC — 84 2115 62
REF AUTHOR PONNAMPERUMA C — P NATL ACAD SCI US — 49 737 63
CITED BY FERRIS JP — ORGEL LE
J AM CHEM S — 87 4976 65 L 27R N21 — 69822
AMINOMALONONITRILE AND 4-AMINO-5-CYANOMIDAZOLE IN HYDROGEN CYANIDE POLYMERIZATION AND ADENINE SYNTHESIS

(SOURCE AUTH) CALVIN M
THE ITEM BY BELSKY T
CITED BY BURLINGA AL — HAUG P — BELSKY T — CALVIN M
P NAS US — 54 1406 65 — 23R N5 — 70042
OCCURRENCE OF BIOGENIC STERANES AND PENTACYCLIC TRITERPANES IN AN EOCENE SHALE (52 MILLION YEARS) AND IN AN EARLY PRECAMBRIAN SHALE (2.7 BILLION YEARS) - A PRELIMINARY REPORT

Figure 6. Some papers retrieved by ASCA concerning chemical evolution (origin of life).

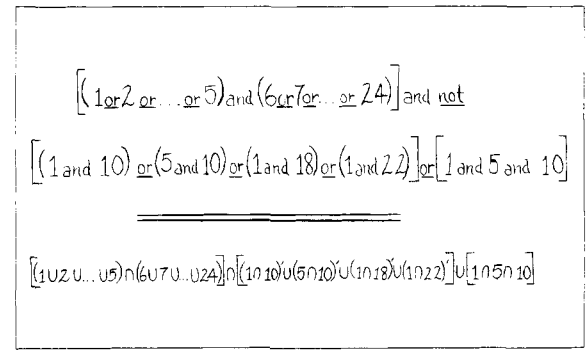
indexing will not be completely adequate for getting at certain other types of information.

Suppose a chemist is trying to synthesize a particular chemical compound. If this compound has never been reported in the literature before, it may not be practicable for the chemist to identify starting references that would be necessarily identified with that compound. If the title of a paper were, for example, "The First Synthesis of Pentafluoropyridine," one might assume that *ASCA* could only report this paper through a term like pentafluoropyridine. However, the chemist could learn of such a paper through citation indexing, if, in fact, he could anticipate the possible procedures of synthesis that might be employed in order to produce such a compound. Thus, when this particular chemical was indeed first reported, the authors of the paper cited a well-known method for synthesizing fluoropyridines. This earlier paper would have been a logical starting reference in a citation profile. Nevertheless, it is not unreasonable to assume that some other completely unique method for synthesizing the compound might also have been cited, which our chemist might not have anticipated. That papers published in chemical journals cite from 10 to 20 references, and thereby provide a considerable redundancy, does not alter the basic problem that in this type of situation word profiles may be preferred to citation profiles.

Thus, the introduction of word profiles in the *ASCA* III system, by which it is possible for the chemist to stipulate that he should receive alerts to papers containing in their titles a particular word, word stem, or word phrase, adds considerable flexibility to the *ASCA* system. By adding this feature to *ASCA*, however, we must be alert to the danger that inherent inertia on the part of the scientist to avoid the self-disciplining process in preparing profiles may result in the omission from his profile of the less ambiguous "Cited Reference" questions which could make his over-all profile far more effective.

One reason why a citation profile can be more precise than a word profile is the ability of the "Cited Reference" question to delineate clearly a relatively small part of the total literature. Consider a topic as broad as DNA. There were more than 1000 papers published in 1966 that contained this term. In order to identify a subset of the information on this particular topic, one has a choice of specifying, by means of a citation profile, a group of papers on a particular aspect of DNA research. Alternatively, one can stipulate that "DNA" must appear in the title in combination with some other term or terms. Thus, if one is doing work on the DNA content of the brain, the *ASCA* search could retrieve only papers containing both the terms "DNA" and "brain."

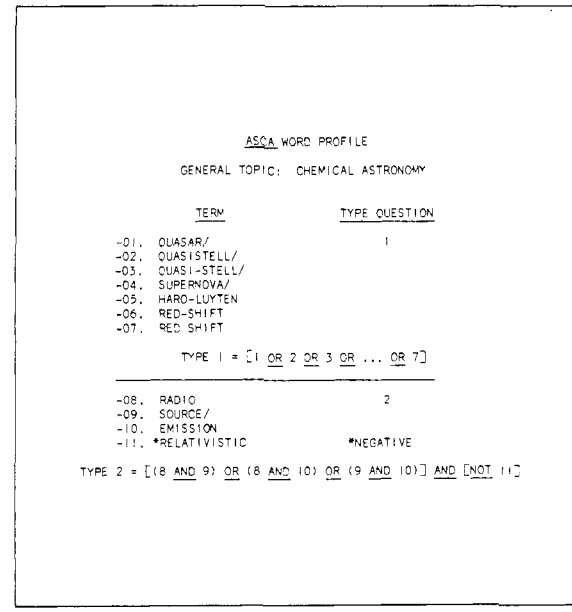
This leads to a discussion of the capabilities of the *ASCA* III system by which it is possible to phrase ques-



[(1 or 2 or ... or 5) and (6 or 7 or ... or 24)] and not [(1 and 10) or (5 and 10) or (1 and 18) or (1 and 22)] or [1 and 5 and 10]

[(1 ∪ 2 ∪ ... ∪ 5) ∩ (6 ∪ 7 ∪ ... ∪ 24)] ∩ [(1 ∩ 10)' ∪ (5 ∩ 10)' ∪ (1 ∩ 18)' ∪ (1 ∩ 22)'] ∪ [1 ∩ 5 ∩ 10]

Figure 7. A Boolean statement illustrating one of the ways that logical relationships may be expressed in ASCA.



ASCA WORD PROFILE

GENERAL TOPIC: CHEMICAL ASTRONOMY

	TERM	TYPE QUESTION
-01.	QUASAR/	1
-02.	QUASISTELL/	
-03.	QUASI-STELL/	
-04.	SUPERNOVA/	
-05.	HARO-LUYTEN	
-06.	RED-SHIFT	
-07.	RED SHIFT	

TYPE 1 = [1 OR 2 OR 3 OR ... OR 7]

-08.	RADIO	2
-09.	SOURCE/	
-10.	EMISSION	
-11.	*RELATIVISTIC	*NEGATIVE

TYPE 2 = [(8 AND 9) OR (8 AND 10) OR (9 AND 10)] AND [NOT 11]

Figure 8. Use of simple type indicator instead of Boolean statements.

tions involving any complexity of Boolean expressions. Thus, Figure 7 shows how a British user expressed his *ASCA* question. The question is also expressed in the more familiar notation of the logicians. However, most *ASCA* word questions are quite simple.

The best way to demonstrate how *ASCA* employs word profiles is to show a few examples (Figure 8). Type 1 terms are those which cause an alert when at least one of such terms occurs in the title. The Boolean expression is, therefore, 1 *or* 2 *or* 3 *or* 4 *or*. . .

Type 2 terms are those where two terms involved must co-occur in a title but not necessarily consecutively. The Boolean expression is (1 *and* 2) *or* (1 *and* 3) *or* (2 *and* 3) *or*... This, of course, can be extended to three or more terms. A term may be either a specific word, a word phrase, or an initial stem of a word or word phrase.

Negation is also possible. A reader, for example, may read a particular journal regularly and will specify that alerts shall be suppressed for items published in that journal. More frequently negation will be applied to a word to help reduce the amount of fallout and/or "noise" which may result from employing other ambiguous or more generic terms. For example, an information scientist might use the term "information" but specify that papers on "genetic information" shall not be retrieved.

A convenient device is the "Chinese menu" type of question (Figure 9). The Boolean expression for such a question is (1 *or* 2 *or* 3) *and* (4 *or* 5 *or* 6 *or*...*or* 16).

The *ASCA* III system is able to handle numerous other types of questions and combinations of questions. Our problem is not, "How can *ASCA* III meet an unusual requirement?" but more often rather, "How many of the almost endless variety of questions available in the *ASCA* III repertoire dare we try to describe without hopelessly confusing the user?" Only a small number of users are vitally interested in Boolean algebra. All they want is the pertinent information with the least effort.

ASCA WORD PROFILE

"CHINESE MENU" COMBINATION TYPE QUESTION

GENERAL TOPIC: ROLE OF ENZYMES AND DNA-RNA SYNTHESIS IN RAT LIVER

CATEGORY A_1			CATEGORY A_2		
TERM NO.	TERM	TYPE QUESTION	TERM NO.	TERM	TYPE QUESTION
-01.	REGENERAT/	$1A_1$	-04.	ADAPT/	$1A_2$
-02.	HEPAT/	"	-05.	INDUC/	"
-03.	LIVER	"	-06.	REPRESS/	"
			-07.	HISTONE	"
			-08.	ACIDIC PROTEIN	"
			-09.	NUCLE/	"
			-10.	RIBOSOM/	"
			-11.	THYMID/	"
			-12.	CYTID/	"
			-13.	URIDIN/	"
			-14.	URIDYL/	"
			-15.	DEOXYCYTID/	"
			-16.	DEOXYURID/	"

TYPE $1A_1$ AND TYPE $1A_2$ = (1 OR 2 OR 3) AND (4 OR 5 OR...OR 16)

Figure 9. Example of a "Chinese Menu" combination type question.

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