AD 622944

October 1965

OAR 65-9

Suggested Criteria for Titles Abstracts and Index Terms in DoD Technical Reports

Alexander G. Hoshovsky

CLEARINGHOUSE
FOR FEDERAL SCIENTIFIC AND
TECHNICAL INFORMATION
Hardcopy | Microfiche
$1.00 | $0.50 | 25 pp
ARCHIVE COPY

NOV 3 1968
TISIA D

OFFICE of AEROSPACE RESEARCH
UNITED STATES AIR FORCE ★

OAR 65-9

SUGGESTED CRITERIA FOR TITLES, ABSTRACTS, AND INDEX TERMS IN DOD TECHNICAL REPORTS

(Based on talk given at the Scientific and Technical Information Officers Course at the Air Force Institute of Technology, January 14, 1965)

By
A. G. Hoshovsky

Office of Scientific and Technical Information
OFFICE OF AEROSPACE RESEARCH, WASHINGTON, D. C.

October 1965

INTRODUCTION

This talk is concerned with the preparation of titles, abstracts and keywords in technical reports of the Department of Defense. The reason for selecting this topic stems from the conviction that the quality of these three aspects of technical reporting are essential to the effective transfer of documented S&T information.

As you will recall, the quality of titles, abstracts, and keywords has been highlighted and brought to the attention of the whole research and engineering community by the so-called Weinberg Report. This President's Science Advisory Committee report stated that the individual scientist and engineer must participate in the information transfer process, and not leave the entire process to the professional documentalist. In particular it urged the authors to:

"a. Title papers in a meaty and informative manner

"b. Index their contributions with keywords taken from standard thesauri

"c. Write informative abstracts." (1)

I am sure you are familiar with the way in which this set of recommendations has been implemented in the Department of Defense, and therefore will skip the chronology of various DoD actions. The tangible product of this implementation is the current DD Form 1473, and the corollary instructions in the Armed Services Procurement Regulations.

But, to tell the authors what must be done and providing them with a form on which to do it is not enough. Authors are not abstracters or indexers. They cannot be expected to know the art of documentation

as well as they know their science. If we expect them to do the work of documentalists, we are obliged to advise them about the criteria and techniques of the documentation profession.

Unfortunately neither the Weinberg Report, nor the Procurement Regulations, nor most of the service regulations and guides offer this kind of advice. Further, many of the organizational editors employed to help the authors with their writing, know little about information retrieval, and therefore don't offer this kind of advice.

What is still worse, as yet there is no universal agreement even among the documentalists on criteria to be applied. Depending on one's orientation there are those who favor brevity and propose telegraphic style even at the expense of clarity. Others take an opposite view. Still others cannot agree on the verb forms, points of view, length or inclusion and exclusion of certain data.(2) These and other subjects have been now studied by an American Standards Association's Working Group on Abstracts for over two years. Hopefully an agreement can be reached soon.

My purpose today is not to establish universal standards. Rather, I want to point out some of the shortcomings found in DoD technical reports and to suggest a few guidelines toward better titles, better abstracts and more useful keywords until the ASA standards become available. I hope some of you may find these guidelines useful.

TITLES

Shortcomings

To acquaint you better with the shortcomings in titles I have here a few horrible examples taken from actual DoD technical reports. The

first one reads "Electrical and Electronic Properties of Materials Information Retrieval Program." Believe it or not, it has been composed by information specialists. Contrary to my expectation, it does not deal with the electrical and electronic properties of materials. Actually, it is a status report of the Information Center on Electrical and Electronic Properties of Materials located at the Hughes Aircraft Company.

The next one seems to be more suitable for a detective story; its title proclaims in bold capital letters "ELF INVESTIGATIONS." To the initiated" it means that the document deals with the extremely low frequencies, but to the computer and, for that matter, to a $3500/year key punch operator, it means nothing.

Figure 1 shows other examples of "un-information." Very likely the first award should go to the one titled "Input-Output Experiment." It deals with an experiment to determine the feasibility of using auroral phenomena to simulate the ionizing effects produced by high altitude nuclear detonations; clearly an aspect of geophysics and not of computer technology.

The Problem

The construction of an informative title is not easy. Remember that here one tries to abstract from a 500-or 5000-word paper the contents, the significance, and the nature of the work, and express all this in five or six words. Which of these 500 words to select - this is the dilemma. It is useless to criticize authors when they come out with unacceptable titles. The thing to do is to offer them adequate suggestions which will allow them to make a selection of informative terms.

AD-608 154 Div. 2, 12, 30
OTS Prices: HC $2.00/MF $0.50

Lockheed Missiles and Space Co., Sunnyvale, Calif.
INPUT-OUTPUT EXPERIMENT.
Semiannual technical summary rept. for period ending 30 Sep 64,
by R. E. Meyerott. 26 Oct 64, 42p LMSC-8-79-64-1
Contract Nonr3398 00

AD-606 325 Div. 15
OTS Prices: HC $1.00/MF $0.50

Innsbruck Univ. (Austri.).
REPORT ON A VISIT OF PROF. E. SCHMUTZER.
Special scientific rept. no. 6,
by W. Majerotto and F. Cap. 3 Jan 64, 10p
Contract DA91 591EUC2947

AD-606 850 Div. 1, 17
OTS Prices: HC $1.00/MF $0.50

RAND Corp., Santa Monica, Calif.
WHY BERYLLIUM,
by James C. DeHaven. 14 Mar 58, 10p P-1307

AD-608 224 Div. 15, 9, 5
OTS Prices: HC $1.00/MF $0.50

Maryland Univ., College Park.
FUNDAMENTAL RESEARCH IN APPLIED MATHEMATICS,
Final rept. for 1 Jul 62-30 Jun 64,
by M. H. Martin. Jul 64, 9p
Grant DA ARO D31 124G134. Proj. 407M
AROD 407 67

AD-448 994 Div. 32, 25, 5, 2, 16

Aerospace Technology Div., Library of Congress Washington, D. C.
STATUS OF ATD PROJECT, HQ OFFICE OF AEROSPACE RESEARCH UNITED STATES AIR FORCE AS OF 30 SEP 1964.
Sep 64, 32p.

AD-448 287 Div. 25

Massachusetts Inst. of Tech., Cambridge.
MAGNETIC TRANSLATION GROUP,
by J. Zak. 6 Dec 63, 5p.
Contract AF19 604 7344
AFOSR 64 1740 Unclassified report

AD-448 043 Div. 1, 9, 25

Institute for Aerospace Studies, Univ. of Tor (Ontario).
THE NOISE OF AIRCRAFT.
by N. S. Ribner. Aug 64, 60p. Review no. 24
Grant AFOSR223 64
AFOSR 64 1310 Unclassified report

AD-449 145 Div. 30, 8, 12

Boeing Co., Seattle, Wash.
ENGINEERING DEVELOPMENT INTEGRATION TEST REPORT,
by B. W. Booms. 4 May 62, 1v. Rept. no. DN D2 12635
Contract AF04 647 289

Figure 1

Since titles are for the benefit of the would-be reader, let's consider what might go through the reader's mind when he looks at a title and decides whether or not to order the paper from his library. I suspect that the first question he might ask himself is: "Do I recognize any words here that represent the subjects in which I am interested?" His second might be: "Does the author cover the area with appropriate orientation, i.e., is it viewed from the point of view which I would like to explore?" Finally he might hesitate on the

nature of the writing: "Is it theoretical, practical work of immediate application, original work, review of literature on the subject, a new way of applying old knowledge, etc.?"

When the reader has the document in his hand, or uses such a publication as the Technical Abstract Bulletin of the Defense Documentation Center, an affirmative answer to the first question may lead him to scan the abstract where his second and third question will be answered. But when the source is a document such as the Index of OAR Research Results which lists only titles, or a list of references in another paper, he must either order the document, ask other people if they know about it, or forget the whole sorry mess and go on with his regular work.

Suggested Elements of an Informative Title

If you accept this as a reasonable assumption of the reader's behavior, you might construct for yourself a set of preliminary criteria for an informative title. Accordingly, a good informative title will contain words which give a clue to.

a. The subject of the paper (what area is studied)

b. The purpose of the study (what are we looking for)

c. The nature of the study (report on an experiment, state-of-the-art, critique, etc.)

These words must now be connected into a meaningful phrase. The meaning is achieved by the use of prepositions and conjunctions.[3]

By way of illustration let us take a look at the document mentioned earlier titled "ELF INVESTIGATION." From reading the introduction we find that the author studied the naturally occurring magnetic signals

in the frequency range of about 10 cycles per second. The same introduction reveals that he studied it in order to determine the global behavior of these signals. Finally, from the text it became apparent that this is the first time that anyone has tried to conduct measurements on such a large scale. Using our set of criteria we could reconstruct the title to read: "World-Wide Magnetic Field Measurements of Extremely Low Frequencies in the Atmosphere."

There are other ways the title could be constructed, using different words and a different way of connecting them into a meaningful phrase. But it requires that the author consider the eventual reader, evaluate the contents of the report, and pay attention to the informational content of single words.

Other Attributes of a "Good" Title

As you know, practically all titles will at some time or other be mechanically processed. The digital computer, designed to reduce the drudgery of repetitive operations, is still rather a simple beast operating on numbers one and zero, and limited to a precise set of logic designed by its programmer. It imposes therefore a set of limitations which must be observed. In case of titles these limitations deal with the length of titles, superscripts and subscripts and use of words of broad and general meaning.

Length. If possible the length of a title should be limited to about 100 characters (including spaces between words). Many of the so-called Keyword in Context Indexes still use a program which allows only 60 characters to be printed; words beyond this limit are omitted (Figure 2).

Bibliographic Entry →

Indexed Key Words

APCRL 64 0367
LIFGF U BELGIUM
INFRARED SPECTRA OF ASTRONOMICAL ...
INSTRUM...
PROJ/TASK 8667

APCRL 64 0376
STANFORD RESEARCH INST MENLO PARK CALIF
INVESTIGATION OF PROPAGATION-LIMITED COMPUTER NETWORKS
APR 1964
BY FLAPAN B
GOLDBERG J
HINRICH H C
SHORT R A
STONE H S
DOC NUMBER 603160
INSTRUMENT AF 19(628)-2900
PROJ/TASK 4641 01

APCRL 64 0378
BROWN U PROVIDENCE R I
...ATION OF NONLINEAR CURRENTS AND GENERATION OF
... WAVES IN AN ISOTROPIC PLASMA, JUN 1964
INSTRUMENT AF 19(628)-2900
PROJ/TASK 8635 02

... 30 APR 1964 ... C AND APCRL 64 0399
...PRESSED CIRCULAR CYLINDRICAL SHEL AFOSR 64 1037
COMPRESSIBLE BOUNDARY LAYER IN THE S AFOSR 64-1120
COMPRESSIBLE PLASMA & PARTS I AND APCRL 64 0472
COMPRESSIONAL HYDROMAGNETIC WAVES AFOSR 64-1377
COMPRESSIONS BETWEEN ROCKET AND AEROSP AFOSR 64 1130
COMPUTATIONS BASED DIRECTLY ON THE C APCRL 64 0509
COMPUTER & AND CONTROL PROCEDURES FO AFOSR 64-1535
COMPUTER ... 1964 ANOMALIES THROU APCRL 64 0570
COMPUTER APPROACH TO LASER DESIGN & APCRL 64 0580
COMPUTER DESIGN OF THE DIPOLE PARAME APCRL 64 0447
COMPUTER NETWORKS APR 1964 APCRL 64 0376
COMPUTER PROGRAM FOR CALCULATING NON AFOSR 64 0079
COMPUTER RECOGNITION OF CONNECTED MA AFOSR 64-1570
COMPUTER RESEARCH INTO THE ENERGY-BA AFOSR 64 1081
COMPUTER SOLUTION OF A ...

MATRICES WITH POSITIVE INVERSE
... OF A NOCTURNAL INVERSION AND A LOWLEVEL JET JULY APCRL 64 0504
THE LAPLACE TRANSFORM INVERSION OF A TRANSFORM RELATED TO AFOSR 1171
PRODUCE TRANSITIONS AND INVERSIONS AT ARBITRARY FREQUENCIES APCRL 64 0143
NUMERICAL ANALYSES OF INVISCID AND VISCOUS FLOW FIELD IN ARL 64 0146
AND THREE - DIMENSIONAL INVISCID UNSTEADY FLOWS BY THE METHO AFOSR 64 1055
...NES OF DOPED GASES AND - INEGAL-R- AL & AND PHOTOLUMINESCE AFOSR 64-1339
...IODINE DIOXIDE, AND IODIC ACID -- IODINE MIXTURES IN AFOSR 64-1370
...DECOMPOSITION CATALYZED BY IODICE IOD SOLVOLYTIC DEGRAD AFOSR 64-1502
...REACTIONS FOR CADMIUM IODIDE LAMBDA 3161 AND SILVER IODIDE ARL 64 0157
... AND SILVER IODICE LAMBDAGLAMBDA 3281 AND ... ARL 64 0159
... WITH HOMMALOGEN ACID ... AFOSR 64-1410

LONG DURATION SPARK LIGHT SOURCE FOR STREAK SCANNERS
OF CHEMICAL ENERGY TO LIGHT, FINAL REPORT, JUN 1964 AFOSR 64-1271
TYPES OSCILLATIONS BETWEEN LIGHTNING DISCHARGES AND DIFFERENT T APCRL 64 0400
...ONS OF THE ... & LONG LINE AZIMUTHS FROM OPTICAL OBSERVATE APCRL 64 0446
PREDICTED FLAMES AND LINE INTENSITIES IN LARGE TYPE MODEL AFOSR 64-1397
...V OF THE PERFORMANCE OF LINEAR AND NONLINEAR FILTERS, A STUD AFOSR 64-1068
THE LAMBDA METHOD FOR & LINEAR BOUNDARY VALUE PROBLEMS III. AFOSR 64-1394
IDENTIFICATION OF LINEAR DYNAMIC SYSTEMS AFOSR 64-1309
...OUS APPLICATIONS OF LINEAR GRAPHS AFOSR 64-1068
VALUE PROBLEM FOR LINEAR HYPERBOLIC PARTIAL DIFFERENTI AFOSR 64-1731
SOLUTION FUNCTIONS & A LINEAR MAPPING OF THE SPACE OF DISTR AFOSR 64-1686
...QUANCEPOPULATION OF THE LINEAR OPTIC EFFECT AT MICROWAVE FRE AFOSR 64-1565
AN ATYPICAL PROBLEM FOR LINEAR ORDINARY DIFFERENTIAL EQUATIO AFOSR 64-1615
... CONTROL OF NON- LINEAR SAMPLED - DATA SYSTEMS TIME AFOSR 64-1599
... TECHNICAL MACHINES AFOSR 64-1962
AFOSR 64-1919

LOGIC NETS & 30 MAY 1964 APCRL 64 0009
...LINEAR NETWORK ANALYSIS - THE PARAMETRIC AP AFOSR 64-1966
...QUANTITIES NETWORK SYNTHESIS THROUGH HYBRID APCRL 64 0560
...FOUNDATIONS OF NETWORK THEORY AFOSR 64-1732
A THEORY OF RESONANT NETWORK AFOSR 64-1609
...ON OF THRESHOLD ELEMENT NETWORKS & APPLIED TO THE DESI AFOSR 64-1332
...P NAND - COMPONENTS OLC NETWORKS & OF THE A - MATRIX O AFOSR 64-1967
A THEORY OF NONLINEAR NETWORKS - I AFOSR 64-1319
...ATIONALLIMITED COMPUTER NETWORKS APR 1964 & OF PROPA APCRL 64 0376
SYNTHESIS OF SWITCHING NETWORKS COMPOSED OF N-OUT-OF-M AFOSR 64-1370
NEURAL THEORY AND MODELING AFOSR 64-1604
...LOGY, FINAL REPORT, & NEURONE REGENERATION AND NEUROPHYSIO AFOSR 64-1636
& PETROSSIALS FROM GIANT NEURONS & OF OXYGEN ON RHYTHMI AFOSR 64-1372
OF DOPAMINE CONTAINING NEURONS IN THE ...
TRIES
& ACTIVE ...

... PROPAGATION IN AN ALMOSTSTRATIFIED APCRL 64 0570
... PLANE PROPAGATION IN HYDROGEN -AIR MIXTURE AFOSR 64-1472
... 18 JUN 1964 PROPAGATION OF AN INFRARQUE PULSE IN APCRL 64 0447
...ACCESS DETERMINISTIC CH PROPAGATION OF ELECTROMAGNETIC WAVES APCRL 64 0196
...IONOSPHERIC PROPAGATION STUDIES, 1 JUN 1964 APCRL 64 0443
LONG RANGE PROPAGATION STUDIES, 8 MAY 1964 APCRL 64 0481
...AN HIGH FREQUENCY RADIO PROPAGATION STUDY, 30 JUN 1964 POR APCRL 64 0365
...& APR GINVESTIGATION OF PROPAGATIONLIMITED COMPUTER NETWORK APCRL 64 0376
...BURNING RATE OF A SOLID PROPELLANT & MEASUREMENT OF THE AFOSR 64-1460
...IONA LRESEARCH ON SOLID PROPELLANT COMBUSTION INSTABILITY ...
...RESTARCH INCUCED SOLID ...
...& OF THE REACTIONASOLI ...
THE SURFACE ...

Figure 2

Those of you who are interested in the technicalities of this limitation should read Luhn's paper on KWIC.[4]

"Forbidden" Words. The premium placed on space in the computer's memory dictates that words of general significance be avoided. Those who design retrieval systems know that one is seldom interested in such words as "report," "explanation," "uses," "model," "aerospace," as recognition or retrieval clues. Hence an effort is made to place them on the "forbidden" list; the computer automatically excludes them from being used as indexing terms. In an index concerned with information handling, it is entirely possible that a title "Report on Some Most Recent Thoughts Affecting the Exchange of Information in the Field of Technological Innovation" would be automatically excluded.

Symbols. The third limitation is in the use of superscripts and subscripts. This is due to the present limitations in many computer print-outs which will write CO_2 as CO2; $(CH_3)_3NH^+$ as (CH3)3NH PLUS; and $\log_2 P^1$ as LOG2 PI. Keypunch personnel cannot be expected to translate all of these symbols into equivalent word-descriptors.

The advances in computer technology and information processing techniques will in time solve some of the problems; in the meantime we should be careful to produce titles which can be machined with the existing tools and techniques. This is one way to assure that our writings are brought to the attention of others.

INFORMATIVE ABSTRACTS

The Problem

Abstracts come in two general types: the indicative, which is not much more than a healthy extension of the title, and the informative, which gives the actual substance of the paper. Historically the

informative abstract was developed to act as a substitute for the paper; a natural reaction to the inability of certain groups to keep up with the literature in rapidly expanding fields. The writing of such abstracts became a highly skilled business - not likely to be done well by non-scientists. This led the abstracting services to employ scientists in various disciplines, usually on a nonresident basis. Shortages of scientists willing to do this work further led the journals to require "author abstracts."

Unfortunately many authors simply do not know the difference between an informative and indicative abstract; even fewer of them know the essential elements which should be included in the informative abstract to convey the important contents of the paper. What is still worse, many editors are too preoccupied with commas and margins to give sufficient attention to this part of the report.

The examples of poor abstracts are many and varied. A most recent example worth exhibiting is one prepared by the people who should know better. It can be seen in all its glory in Figure 3. Of course, this is an extreme case. Most abstracts are at least intended to convey some information about the document.

THE CRITERIA FOR AN INFORMATIVE ABSTRACT

The Contents

If the abstract is to give faithful representation of the paper, it ought to tell us:

Why the work? (the purpose)

How accomplished? (the method)

What facts? (the results)

What meaning? (the conclusion)

UNCLASSIFIED
Security Classification

DOCUMENT CONTROL DATA - R&D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author) Air Force Systems Command	2a. REPORT SECURITY CLASSIFICATION UNCLASSIFIED 2b. GROUP N/A

3. REPORT TITLE

Proceedings of Air Force Second Scientific and Technical Information Conference, 28-29 April 65

4. DESCRIPTIVE NOTES (Type of report and inclusive dates)
N/A

5. AUTHOR(S) (Last name, first name, initial)

N/A

6. REPORT DATE September 65	7a. TOTAL NO. OF PAGES	7b. NO. OF REFS N/A

8a. CONTRACT OR GRANT NO. N/A b. PROJECT NO. c. d.	9a. ORIGINATOR'S REPORT NUMBER(S) None 9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report) None

10. AVAILABILITY/LIMITATION NOTICES

Distribution of this Document is Unlimited

11. SUPPLEMENTARY NOTES None	12. SPONSORING MILITARY ACTIVITY AFSC

13. ABSTRACT

Contains various papers read and working group reports developed at the AF STINFO Conference.

DD FORM 1 JAN 64 1473

Figure 3

UNCLASSIFIED
Security Classification

Note I have not mentioned the "What." This should be evident from the title which accompanies the abstract; in fact the title is normally considered as part of the abstracting entry. The "What" will also become evident from the words in the abstract. The purpose, method, results and conclusion are then the essential elements of the abstract. The Abstract in Figure 4 meets these criteria.

THE PURPOSE THE METHOD

We conducted experiments to determine the electron interaction in decaying afterglow plasmas at temperatures as low as 5°K. Such low energies are present when the parent gas is immersed in a bath of liquid helium of 4.2°K. Our method included electronic microwave diagnostic techniques coupled with radiometric procedures. Experiments were performed for neutral densities in the range 2.3×10^{17} to 1.2×10^{18} atoms/cc. Concurrently, we inferred electron temperatures from microwave noise radiation from the afterglow plasma.

An "effective" collision cross section computed on the basis of binary collision theory is 1.9×10^{-15} cm^2 at the low end of the above density range. This value is 3½ times larger than the cross section at 300°K.

The electron temperature relaxation during plasma decay is some two orders of magnitude longer than that expected if the dominant mechanism were elastic collisions with neutral gas atoms.

Electron heating through superelastic collisions with a helium singlet metastable atom appear to be the cause of long relaxation times. A cross section of 6×10^{-2} cm^2 at 4.2°K is deduced for the collisional de-excitation of these metasable atoms by atoms in the ground state.

Interpretation of afterglow quenching experiments indicates that electron recombination loss in low temperature helium plasmas may be controlled by the rate of production of helium molecular ions.

THE MEANING THE RESULTS

Figure 4

Of course not all the abstracts can be broken down this way, or in this order. The order may differ because it may be easier for the author to start with the conclusion and end with the method. The paper may not have a conclusion because it represents only a compilation of data. The method may not be appropriate because the paper is only a review of work done by others. These variations must be accepted. Nevertheless the attempt to consider these elements should result in

better and more informative abstracts. As a minimum it will get you to think about the informational content and, where necessary, it will lead you to substitute other important aspects such as scope of the investigation, validity of the experiment and similar attributes of the work. It may also lead you to reconsider the contents of your paper. You may even rewrite it.

Phrases and Symbols. The second element concerns the use of words, phrases and symbols to reflect the informational content. As you know the brevity of the abstract is its essential characteristic. So is the clarity, if the abstract is to convey meaningful information. These two are often mutually at odds; striking a satisfactory balance is an art which must be acquired by practice. One way to assure clarity is to question every technical word. Here the use of the dictionary will help; not as an authority to determine the meaning of the word used in your specialty, but to find out if the word's everyday meaning may mislead the reader.(5)

Length. On the side of brevity the abstract is best when it is limited to 200-250 words. This can be done in most cases by avoiding idle words, which do not add to the informational content. Figure 5 shows how an author-prepared abstract was reduced by simply crossing out the words and phrases without noticeably reducing the informational content of the abstract. Figure 6 shows what can be done with a simple reorganization of the text. Figure 7 shows an abstract rewritten to conform with our formal criteria for an informative abstract.

Original

Abstract

Between June 1963 and June 1964 a series of measurements of horizontal magnetic field in the 5-15 cps frequency range have been performed simultaneously, at 23 different dates, at sub-to-certain separated in the East-West direction by approximately 3750 miles. The stations are located near Kingston, R.I. on the American East Coast (85 miles South of Providence, R.I.) and in Brandenburg, Germany (60 miles southeast of Munich, in the Bavarian Alps).

A consideration of system time delays and possible differences in propagation path lengths indicates that if waveforms recorded at both locations came from the same source they should appear within one tenth second on both records.

Three minute recordings on paper tape running at 22 mm/second were obtained for a total of approximately 160 minutes. On 5 among 23 days a total of 10 cases were noted where waveforms began within 0.1 second of each other at both stations. Considering individually each 3-minute recording on which simultaneity was observed statistical analysis was performed which takes into account the total number of waveform starts, assuming throughout level during each recording period. The results of this analysis [illegible] shows that the number of simultaneously received signals is too large for purely accidental coincidence and it is concluded that these signals have most likely originated from the same source.

A study [illegible] of the "Solar Flare Activity Index" (published by the High Alt. Observatory, Boulder) which is an indication of the integrated Lyman-α flare energy from the visible disk shows a significant correlation between this index and the occurrence of simultaneous ELF wave trains at the two locations.

Figure 5

Reviewed Abstract

Twenty-three simultaneous measurements of the horizontal magnetic field in 5-15 cps range were made near Kingston, R.I. and Brandenburg, Germany. The assumption was that if the wave forms recorded at both locations came from the same source they would appear within one tenth second on both records.

The results show ten out of twenty-three recordings to contain wave forms which begin within 0.1 second of each other at both stations. Statistical analysis of each 3-minute record indicates that the number of simultaneously received signals is too large to be purely accidental coincidence.

The simultaneous occurence of extremely low frequency wave trains at these locations shows significant correlation with the index if integrated lyman-alpha flare energy from the visible disk of the sun.

As a minimum it will get the author to consider these points, and if necessary substitute other important aspects such as scope of the investigation, validity of the experiment and the like.

Figure 6

Rewritten Abstract

Purpose Study of the horizontal magnetic field in the extremely low frequencies (5-15 cps) were carried out over the distance of 3750 miles to understand the global behavior of this phenomenon.

Method Allowing for possible differences in the propagation path and measuring system delays, an assumption is that the same wave form recorded at two distant stations (Kingston, R.I. and Brandenburg, Germany) within 0.1 second of each other comes from the same source.

Results Twenty-three measurements were taken between June 1963 and June 1964. In ten of them the wave forms began within 0.1 seconds of each other. Statistical analysis ruled out accidental coincidence.

Conclusion Comparison between our recordings and the Solar Activity Index shows significant correlation between the occurence of these waves and the integrated Lyman-alpha flare energy from the visible disk of the sun.

Figure 7

INDEXING THE PAPER

The Problem

The shortage of indexers is forcing still another task on the authors. Here the author is asked to indicate by a set of single words or short phrases the clues by means of which one may search for a document in a collection of many papers on varied topics. This is an area of heated controversy among the documentalists and retrieval specialists. It is not my purpose to join this controversy. Rather, I would like to point out that the Engineers' Joint Council requires author indexes for papers published in their journals, and recently the Department of Defense made this requirement a companion to the author-produced abstracts. Here is what the Department has to say about indexing terms:

> "KEYWORDS: Keywords are technically meaningful terms or short phrases that characterize a report and may be used as index entries for cataloging the report. Keywords must be selected so that no security classification is required. Identifiers, such as equipment model designation, trade names, military project code name, geographic location, may be used as keywords but will be followed by an indication of the technical context."

Selection Criteria

If author indexes are to be more than a random collection of general terms (of little value in a retrieval system) then a

generalized set of criteria, like those for titles and abstracts, is necessary.

Accordingly, I would like to suggest the following set of "rules."

1. Use terms which have a precise meaning. Either a manual or machine system can easily translate the specifics to the general. The reverse is not possible.

2. If possible, also use the terms listed in the DDC Thesaurus of Descriptors. This is the vocabulary of DDC; this is the primary place where your index terms will be used. If you use a new term (as yet not in current use) explain its meaning.

3. Plan to use at least one term for each of the following aspects of the research (or study):

a. Specific materials/data/theories/theses studied

b. Specific properties determined experimentally (or theoretically)

c. Specific methods or processes investigated

d. Equipment used

e. Specific applications for materials/methods/processes/equipment, wherever they show promise beyond the particular experiment

4. Also add the generic expression to the specific terms, i.e., "supersonic aircraft" as well as "B-70."

These are a few simple guides. They will not make authors to be expert indexers; nor is this their purpose. But they will make the supplied index terms mean more.

LINKS, ROLES AND WEIGHTS

Now a word about the links, roles and weights. Although they are optional parts of the DoD instruction, they deserve our consideration.

Why Links, Roles and Weights?

Briefly, these three concepts were developed to cope with the problems of false retrieval. The false retrieval occurs when the index terms used as clues to retrieval of documents recover the documents which are not relevant to the problem of the user. This, in the language of information specialists, is known as "false drops" or simple "noise."

The noise occurs because the index terms have been removed from the context. Standing alone they do not show how they were used in the text. You don't know their relationship to other index terms which describe the document. You have no idea whether the index term represents a serious and detailed treatment, or whether it was used only in passing in connection with some other subject.

Consider the following index terms which could be assigned to my lecture:

Writing

Abstracting

Meaning

Technical Reports

If you were a semanticist, concerned with "meaning of words" and asked the retrieval system to get you documents which deal with "meaning," you would recover my paper. For you, my paper would be simply a "false drop." Or if you wanted a paper on the outlines for writing technical reports and asked for "writing" and "technical reports" the recovery of my paper would similarly be discouraging.

The Basic Concepts

Briefly, links are symbolic representations attached to the index terms to show that certain words appear together in a sentence or

paragraph; i.e., they are somehow linked with each other. Thus the 1964 OAR Annual Report could have the following terms: research, budget, professional personnel, scientists, rockets, nuclear physics, etc. The document (let's number it 1000) would be indexed:

Research	1000A
Budget	1000A
Professional personnel	1000B
Scientists	1000B
Rockets	1000C
Nuclear physics	1000D, etc.

The letter "A" would show that budget and research are connected in the document. Similarly, the letter "B" would link the terms "professional personnel" and "scientists." You would also know that nuclear physics is <u>not</u> linked with the budget.

<u>Roles</u> are the symbols which act as a sort of grammar - they show the function of the word in a document. It may be that the word represents "something which is acted upon" or "an agent which acts upon something." For example, a paper which deals with the "effects of cosmic particles on the titanium skin of a spacecraft" would have:

Cosmic particles	200A2
Titanium	200B1
Spacecraft	200A1
Skin	200B1

The numeral "1" after the letter "A" signifies the object which is acted upon and the numeral "2" signifies the agent which acts. These are preassigned meanings as determined by the operators of the retrieval system.

Weights would tell you the emphasis given to the word in the text. In the same example you might indicate:

Cosmic particles 2000A-2-2
Titanium 2000B-1-1
Spacecraft 2000A-1-3
Skin 2000-B-1-3

In a system where 1 means "extensive treatment," 2 means "slight treatment," and 3 "mentioned in passing" the term "Titanium" would be the most important subject in the report.

The Difficulties

From the above explanation you might conclude that links, roles and weights are simple concepts, which should not present any serious problem in their application. The real retrieval systems, however, are complex. They have many thousands of documents; even more index terms. They deal with more than one topic, from many points of view. This is where the simple concept of links, roles, and weights runs into difficulties.

Time will not permit me to deal adequately with these difficulties, and I must refer you to the literature on this subject (References 6, 7, 8 and 9). Briefly these general observations are applicable to links and roles.

a. The use of links and roles breaks down unless there is high consistency in their assignment. Usually, only the trained indexers are capable of such consistency.

b. The roles used in engineering sciences may be totally inadequate in psychological or mathematical sciences. Separate coding systems are often required for various disciplines, and for different collections of documents.

c. The links can do a decent job to show how certain words are separated in a document which deals with several subjects (such as annual or quarterly report). They are inadequate for showing relationships.*

SUMMARY

I will now summarize what we have been talking about. I will do this in the form of an "Author's Check List" which follows (Figure 8). It should constitute a quick reference to what we have been talking about. It can also be used as a check list for writing or reviewing technical reports.

Titles, abstracts and index terms are our present "handles" of recognition and retrieval. The more frequent use of machine produced indexes, the demand for better information services, the increasing cost of processing large volumes of documents and a greater reliance of users on "capsulated information," demand that we increasingly concentrate on these handles and try to make them more useful. In this way, I believe, we will be getting at the root of many problems which plague both the users and the operators of document retrieval systems.

---

*A paper by Taube explains the inherent theoretical inadequacy of links as a method of showing the relationship between words.[6]

AUTHOR'S CHECK LIST

Design	Title
☐ The purpose of the work is clearly stated	☐ Definitive
☐ The method of investigation is explained or referenced	☐ Subject encompassing
☐ New findings are easily found in the text	☐ Superfluous phrases eliminated
☐ Conclusion evident or substantiated	☐ Specific terms used
	☐ Superscripts and subcripts avoided
Abstract	**Index Terms**
☐ Acts as a substitute for the full paper	☐ Words of special significance from the title or abstract
☐ Gives significant results (including most important numerical values)	☐ New words from the text for:
☐ States purpose of work	☐ Material/equipment/system
☐ Explains method used	☐ Processes/techniques/operations
☐ Interprets the meaning of findings (conclusion)	☐ Properties/characteristics/attributes
	☐ Generics
	☐ Words which show relationship of this work to other disciplines or applications

Figure 8

REFERENCES

1. The White House, Science, Government and Information, A Report of the President's Science Advisory Committee, Government Printing Office, Jan 10, 1963, p 2.
2. Borko, Harold and Seymor Chatman, "Criteria for Acceptable Standards: A Survey of Abstracter's Instructions," American Documentation, Vol 14 No. 2 (Apr 63), pp 149-160.
3. Hoshovsky, A. G. et al, Author's Guide for Technical Reporting, OAR 64-8, Office of Aerospace Research, Washington, D. C., July 1964. (Available from OAR (RRY), Washington, D. C., as well as from DDC, AD 605 443).
4. Luhn, Hans-Peter, "Key-Word-In-Context (KWIC) Index for Technical Literature," American Documentation, Vol 11, No. 4, Oct 60, pp 288-295.
5. Wooster, Harold, The Preparation of Unsolicited Proposals, AFOSR 65-0392, Air Force Office of Scientific Research, Washington, D. C., 1 Mar 65, p 11.
6. Taube, Mortimer, "Notes on the Use of Links and Roles in Coordinate Indexing," American Documentation, Vol 12, No. 2, April 61, pp 98-100.
7. Sinnett, Jefferson D., An Evaluation of Links and Roles Used in Information Retrieval, ML TDR 64-152, Air Force Materials Laboratory, Wright-Patterson Air Force Base, Ohio, July 1964 (available from DDC).
8. Montague, Barbara A., "Testing, Comparison, and Evaluation of Recall, Relevance, and Cost of Coordinate Indexing with Links and Roles," Proceedings of the American Documentation Institute, Vol 1, Oct 5-8, 1964, pp 357-367.
9. Costello, J. C. Jr., "Storage and Retrieval of Chemical Research and Patent Information by Links and Roles in DuPont," American Documentation, Vol 12, No. 2 (April 61), pp 111-120.

UNCLASSIFIED
Security Classification

DOCUMENT CONTROL DATA - R&D

(Security classification of title, body of abstract and indexing annotation must be entered when the overall report is classified)

1. ORIGINATING ACTIVITY (Corporate author) Office of Aerospace Research Office of Scientific and Technical Information	2a. REPORT SECURITY CLASSIFICATION Unclassified 2b. GROUP

3. REPORT TITLE

Suggested Criteria for Titles, Abstracts, and Index-Terms in DOD Technical Reports

4. DESCRIPTIVE NOTES (Type of report and inclusive dates)

Management, Application, Final

5. AUTHOR(S) (Last name, first name, initial)

Hoshovsky, Alexander G.

6. REPORT DATE October 1965	7a. TOTAL NO. OF PAGES 21	7b. NO. OF REFS 9
8a. CONTRACT OR GRANT NO. N/A b. PROJECT NO. N/A c. d.	9a. ORIGINATOR'S REPORT NUMBER(S) 9b. OTHER REPORT NO(S) (Any other numbers that may be assigned this report) OAR 65-9	

10. AVAILABILITY/LIMITATION NOTICES

Distribution of this document is unlimited.

11. SUPPLEMENTARY NOTES	12. SPONSORING MILITARY ACTIVITY Office of Aerospace Research (RRYD) Washington, DC 20333

13. ABSTRACT

The DOD requires that its authors complete DD Form 1473 (a bibliographic control form) on all DOD technical reports. This requirement should be, but is not now, accompanied by a set of criteria for the preparation of titles, abstracts and keywords.

The titles should be definitive, subject encompassing, and composed from specific terms. Superfluous phrases, superscripts and subscripts should be avoided. The abstracts should contain statements of purpose of the study, methodology used, give significant results, and interpret the meaning of the study; they should act as a substitute for the whole report. Index-terms should be those which describe the materials, equipment or systems used in the study; processes, techniques, or operations inherent in the study. They should contain both generic and specific expressions, as well as words which show relationship of the reported work to other disciplines.

The use of links and roles (an optional DOD indexing requirement) is questioned because it requires a consistency in indexing, as well as different role-definitions in different document collection.

The adoption of the proposed criteria should lead to a more meaningful author participation in the DOD documentation process.

DD FORM 1 JAN 64 1473

UNCLASSIFIED
Security Classification

14. KEY WORDS	LINK A ROLE	LINK A WT	LINK B ROLE	LINK B WT	LINK C ROLE	LINK C WT
Titling						
Abstracting						
Indexing						
Reporting						
Research Program Administration						
Documentation						
Technical Reports						
Authors						
Automation						
Information Technology						
Vocabulary						
Information Retrieval						
Language						

INSTRUCTIONS

1. ORIGINATING ACTIVITY: Enter the name and address of the contractor, subcontractor, grantee, Department of Defense activity or other organization *(corporate author)* issuing the report.

2a. REPORT SECURITY CLASSIFICATION: Enter the overall security classification of the report. Indicate whether "Restricted Data" is included. Marking is to be in accordance with appropriate security regulations.

2b. GROUP: Automatic downgrading is specified in DoD Directive 5200.10 and Armed Forces Industrial Manual. Enter the group number. Also, when applicable, show that optional markings have been used for Group 3 and Group 4 as authorized.

3. REPORT TITLE: Enter the complete report title in all capital letters. Titles in all cases should be unclassified. If a meaningful title cannot be selected without classification, show title classification in all capitals in parenthesis immediately following the title.

4. DESCRIPTIVE NOTES: If appropriate, enter the type of report, e.g., interim, progress, summary, annual, or final. Give the inclusive dates when a specific reporting period is covered.

5. AUTHOR(S): Enter the name(s) of author(s) as shown on or in the report. Enter last name, first name, middle initial. If military, show rank and branch of service. The name of the principal author is an absolute minimum requirement.

6. REPORT DATE: Enter the date of the report as day, month, year; or month, year. If more than one date appears on the report, use date of publication.

7a. TOTAL NUMBER OF PAGES: The total page count should follow normal pagination procedures, i.e., enter the number of pages containing information.

7b. NUMBER OF REFERENCES: Enter the total number of references cited in the report.

8a. CONTRACT OR GRANT NUMBER: If appropriate, enter the applicable number of the contract or grant under which the report was written.

8b, 8c, & 8d. PROJECT NUMBER: Enter the appropriate military department identification, such as project number, subproject number, system numbers, task number, etc.

9a. ORIGINATOR'S REPORT NUMBER(S): Enter the official report number by which the document will be identified and controlled by the originating activity. This number must be unique to this report.

9b. OTHER REPORT NUMBER(S): If the report has been assigned any other report numbers *(either by the originator or by the sponsor)*, also enter this number(s).

10. AVAILABILITY/LIMITATION NOTICES: Enter any limitations on further dissemination of the report, other than those imposed by security classification, using standard statements such as:

(1) "Qualified requesters may obtain copies of this report from DDC."

(2) "Foreign announcement and dissemination of this report by DDC is not authorized."

(3) "U. S. Government agencies may obtain copies of this report directly from DDC. Other qualified DDC users shall request through _____."

(4) "U. S. military agencies may obtain copies of this report directly from DDC. Other qualified users shall request through _____."

(5) "All distribution of this report is controlled. Qualified DDC users shall request through _____."

If the report has been furnished to the Office of Technical Services, Department of Commerce, for sale to the public, indicate this fact and enter the price, if known.

11. SUPPLEMENTARY NOTES: Use for additional explanatory notes.

12. SPONSORING MILITARY ACTIVITY: Enter the name of the departmental project office or laboratory sponsoring *(paying for)* the research and development. Include address.

13. ABSTRACT: Enter an abstract giving a brief and factual summary of the document indicative of the report, even though it may also appear elsewhere in the body of the technical report. If additional space is required, a continuation sheet shall be attached.

It is highly desirable that the abstract of classified reports be unclassified. Each paragraph of the abstract shall end with an indication of the military security classification of the information in the paragraph, represented as *(TS)*, *(S)*, *(C)*, or *(U)*.

There is no limitation on the length of the abstract. However, the suggested length is from 150 to 225 words.

14. KEY WORDS: Key words are technically meaningful terms or short phrases that characterize a report and may be used as index entries for cataloging the report. Key words must be selected so that no security classification is required. Identifiers, such as equipment model designation, trade name, military project code name, geographic location, may be used as key words but will be followed by an indication of technical context. The assignment of links, rules, and weights is optional.