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Department of Industrial Engineering and Management Sciences
The Technological Institute
Northwestern University
Evanston, Illinois

FINAL REPORT ON
AN EXPERIMENTAL INVESTIGATION OF THE
EFFECTS OF TECHNICAL REPORT ABSTRACTS AND
OTHER EXPERIMENTAL VARIABLES ON THE
BEHAVIOR OF INFORMATION USERS

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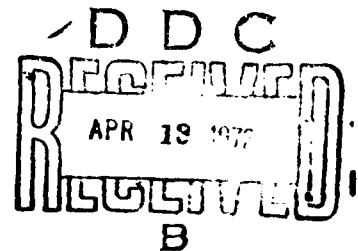
November, 1971

The research described in this paper was carried out by members of the Northwestern University "information search" research team. Members of the research team who have contributed to the work described here are: Albert H. Rubenstein (Principal Investigator), Charles W.N. Thompson (Project Leader), Gustave J. Rath, William Moor, David Werner, Daniel Kegan, Richard Barth, and Lawrence Greenberg.

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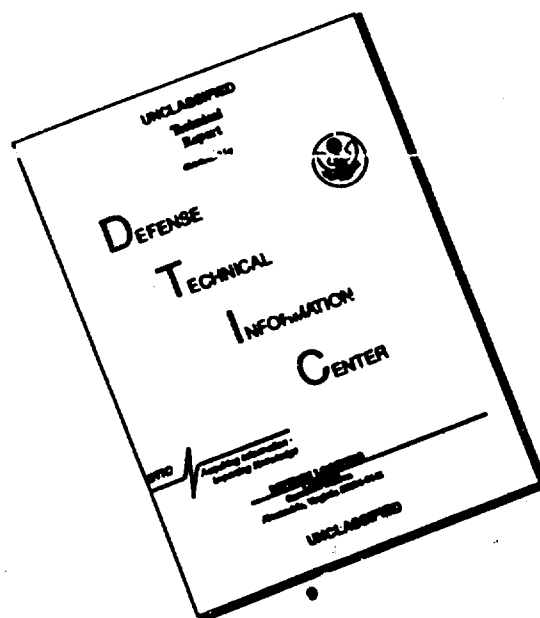


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RESEARCH PROGRESS REPORT (PRECIS)

Title: "An Experimental Investigation of the Effects of Technical Report Abstracts and Other Experimental Variables on the Behavior of Information Users," Charles W.N. Thompson, Department of Industrial Engineering and Management Sciences, Technological Institute, Northwestern University, Evanston, Illinois, Program of Research on the Management of Research and Development No. 71/86, November, 1971; ONR Contract N00014-67-0356-0005.

Background: The Information Systems Branch, Mathematical Sciences Division, Office of Naval Research, provided support on the phase reported here of a long term series of investigations of the information related behavior of engineers and scientists which is being carried out as a part of the Program of Research on the Management of Research and Development in the Technological Institute, Northwestern University, under the direction of Albert H. Rubenstein.

Condensed Report Contents: The field study (or "natural experiment") was conducted in three military laboratories to determine what relationship there is between the presence or absence of an abstract and the time required to make, and "correctness" of, the decision on how to dispose of a technical report or journal article which arrives at the desk of an individual scientist or engineer. The measure of time was a self-report by the individual; the measure of "correctness" was the degree of agreement between the self-report or "usefulness" made at the time of disposition and a later, deliberate evaluation of "usefulness" by the same individual. An arbitrary sample of 85 persons was chosen. Seventy-eight participated to some degree, some minimum usable data was received from 71, and significant amounts of data from 62. For a four week period, each participant was asked to report on the time taken to dispose of, and the "usefulness" of, each technical document he encountered, at the time of the encounter. The researcher later retrieved the documents and determined if an abstract were present, and noted certain other characteristics. Those participants whose data met certain conditions of the study were then presented with selected documents which they had previously encountered, and were requested to again note the "usefulness." These participants were observed during the process of this encounter with the documents, and were interviewed. All participants completed a questionnaire on demographic and background information. With respect to the relationship to time, the data does not support the proposition that there is a strong and clear relation. With respect to "correctness" the same applies. It is concluded that the interrelation of a variety of variables must be accounted for in greater detail before any strong statements concerning the effect of abstracts can be demonstrated. Whatever may be the function and effect of abstracts under laboratory conditions, in the normal, day-to-day field setting, the presence of an abstract does not appear to be a significant factor in the determination of what disposition to make of a document.

For further information: The complete report can be obtained from the Naval Research Center. A few copies are available for distribution by the author.

FINAL REPORT ON AN EXPERIMENTAL INVESTIGATION OF THE EFFECTS OF
TECHNICAL REPORT ABSTRACTS AND OTHER EXPERIMENTAL VARIABLES
ON THE BEHAVIOR OF INFORMATION USERS

Purpose

The purpose of this paper is to report on a field experiment which is part of a long term series of investigations of the information related behavior of engineers and scientists. Specifically, the report focuses on phases of the research which have been supported by the Office of Naval Research (Information Systems Branch, Mathematical Sciences Division).

Scope of the Study

Since 1959, Northwestern University has had, under the direction of Professor Albert H. Rubenstein, a Program of Research on the Management of Research and Development. The program consists of approximately a dozen individual projects or subprograms, focused on specific aspects of the R&D process. Among the subprograms (each consisting of a continuing series of staff studies and graduate theses) are studies of the effects of decentralization on R&D, organization of R&D in newly developing countries, the generation and flow of ideas in R&D, project selection in R&D, and the information seeking behavior of researchers.

The objective of that part of the latter study which is reported here was "to investigate, by means of field experiments in operating R&D laboratories, behavioral effects of the form and use of abstracts of technical reports and other variations in the information environment of researchers." In pursuit of this objective, two phases were outlined, and these, together with a brief description of what was done, will follow.

Phase One

In late 1966, prior to the beginning Phase One, preliminary discussions between A. H. Rubenstein, the Principal Investigator, and R. H. Wilcox, of the Office of Naval Research, took place concerning the general feasibility of exploring, by field experimental means, the behavioral effects of the form and use of abstracts of technical reports. In the early spring of 1967 a preliminary decision was reached to explore the behavioral effects of abstracts in one or more military laboratories, and, based on this, a major literature search was started, a set of preliminary design notes was prepared describing the proposed field setting, outlining the research design

(which was the design eventually used), listing a number of parameters, and stating the objective of an initial proposition (which became the first proposition discussed below). During the summer of 1967, prospective sites were visited and further preliminary designs were explored, leading up to the beginning of Phase One in the fall of 1967.

Phase One covered the design and pilot testing of the field experiment, in five steps, as follows:

- a) An analysis of the area of research interest, based in part on a collection of approximately 700 reports of research and the observation of knowledgeable practitioners, was accomplished; and this resulted in an appraisal of the state-of-the-art, including available methodology, the problems involved, and the potential implications of several alternative research strategies. The most significant general findings, neither of which was wholly unexpected, were that little is known, in a scientific sense, about the behavioral effects of the form of a document (such as the presence or absence of an abstract), and that this may be, in part, due to the second finding that the methodology to examine these effects under field conditions has not been substantially developed. As a corollary, it appeared that the "screening" process which occurs when a document is first physically available to the individual scientist or engineer is central, from a theoretical point of view, to not only a wide variety of behavioral research areas but also research into the design of information retrieval systems. This centrality suggested a significant potential value for the research.
- b) Based on this analysis, a set of researchable questions was developed, and a selection was made in consideration of the advantages and limitations presented by use of field experimental means, and the potential implications of the results of the research. This set included the following questions:

- Does an abstract perform any significant function when the document itself is available?

- What effects do variations in form (length, location in the document, identifying features, etc.) of an abstract have upon the disposition decision?
- What effects do variations in content (descriptive versus informative, "quality," etc.) of an abstract have?
- What effects do variations in the background (age, sex, technical specialty, experience, level of competence, etc.) of an individual have upon the relation between an abstract and his disposition decision?
- What effects do variations in his immediate environment (organizational policies, procedures; task; various available alternative facilities, such as personal files, libraries, abstracting and indexing services, colleagues; characteristics of the queue; personal health; time of day; etc.) have?
- What effects do variations in his immediate purpose (current awareness versus search, information-seeking versus "clearing his desk" or "make work") have?

From these questions, two additional question, which were based on the first question, were developed. These two questions, which provided the basis for the research, were as follows:

- What relationship is there between the presence or absence of an abstract and the amount of time taken to make a disposition decision?
- What relationship is there between the presence or absence of an abstract and the "correctness" of the disposition decision (the "correctness" of the determination of relevance)?

c) From these two questions, two central propositions, together with a number of corollary propositions, were developed, and they were as follows:

- For all documents which are not disposed of on first glance, the disposition time for those documents accompanied by an abstract is significantly shorter than for those which are not.

- For all documents which are not strongly relevant (or strongly irrelevant), the ability to judge relevance is significantly better for those documents accompanied by an abstract than for those which are not.
- d) For each proposition, definitions were developed, indicators of the variables of interest were identified, parameters were established, in terms of measurement or control, and the design of the experiment was outlined.
- e) Research instruments, with several variations, were designed, pretested several times, and then tested in a pilot site.

Phase Two

The conduct of the field portion of the research was accomplished in three Navy laboratories in the Washington area over the period from the middle of July to the end of September, 1968, through the cooperation of ONR and with the active assistance of a key staff member in each laboratory. Negotiations to obtain entry took place over a period of several months and were successful particularly due to the extended efforts by ONR. Through agreement with senior management of the laboratories, the following arrangements were made:

- a) Each laboratory would provide a staff member who would (select and) make arrangements for participants, and for use of library facilities by the Northwestern research team.
- b) Each laboratory would provide participants (25 in one laboratory, and 30 in each of the other two) representing a rough sample of the scientific and engineering population of the laboratory in terms of organizational divisions, the science-to-engineering spectrum, disciplines and seniority (experience and position held).
- c) The university researcher designed the field experiment to limit the involvement of participants as follows:

- (1) An initial briefing, not to exceed thirty minutes

- (2) A four week research period, not to exceed a total of 30 minutes by each individual, to complete a maximum of 100 short forms.
- (3) A post interview not to exceed one hour.
- (4) An overall time limit of three hours.

The initial briefings took place in late July and early August, 1968. Each was within the 30 minute period. Each participant was provided with 50 copies of a one-page form and asked to fill it out for each document (defined primarily as a technical report or journal article) which came across his desk during the research period. The key questions related to the time he took to decide what to do with the report or journal article and the relevance judgment he made. During the research period of four weeks, the university researchers made weekly visits to each laboratory to pick up data, to begin the library search for variables data on reports and journals, and to answer questions raised by the participants.

At the end of the research period, each participant was requested to complete a questionnaire on parametric and background questions which would assist in understanding the variables data. In addition, participants identified according to rules established by the research design were interviewed in person and asked to repeat the relevance judgment they had made previously with respect to selected documents.

All of the data with respect to the participants' decisions during the research period was key-punched after accession into the formal central files maintained for all research data in the Program of Research on the Management of Research and Development. In addition, all available documents for which dependent variable data meeting the propositional requirements was obtained were analysed for the presence or absence of an abstract (and for a variety of parametric data); these data were also key-punched.

In all, 71 persons in the three laboratories completed 950 individual forms, and for these, 391 documents were analysed for the presence or absence of abstracts; 73 persons completed Post Test Questionnaires, and 13 persons

were interviewed. One senior individual who had provided extensive valuable data graciously agreed to a second interview; this was accomplished within the agreed one hour time limit. Twenty-two individuals provided data sufficient to test the first proposition on time taken, and twelve individuals provided data sufficient to test the second proposition on relevance.

Analysis of each set of individual data and analysis of the aggregate provided no support for either proposition. While it is not considered warranted to assert that the null hypothesis, i.e., the presence or absence of an abstract does not make a difference, was proved, it seems clear that a number of "independent" opportunities were presented for the propositions to be supported, and in no instance did support appear. It is concluded that the interrelation of a variety of variables must be accounted for in greater detail before any strong statements concerning the effect of abstracts can be demonstrated. Whatever may be the function and effects of abstracts under laboratory conditions, as described in the literature, in the normal, day-to-day field setting, the presence of an abstract does not appear to be a significant factor in the determination of what disposition to make of a document.

Formal Technical Reports

- 71/85 Charles W.N. Thompson, "Process Descriptive Methods for Assessing Non-Replicated Field Research," Department of Industrial Engineering and Management Sciences, Northwestern University, November 1971.
- 71/84 Charles W.N. Thompson, "The Functions of Abstracts in the Initial Screening of Technical Documents by the User," Department of Industrial Engineering and Management Sciences, Northwestern University, November 1971. (To be submitted for publication).
- 69/47 Charles W.N. Thompson, "Study of the User's 'Natural Queue' of Documents," IEEE Transactions on Engineering Writing and Speech, EWS-13, 1970, pp. 73-78.
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- 70/14 Charles W.N. Thompson, "Comments on Proposed Research, Strategy and Procedures for the Longitudinal Study of Development of Information Searching Behavior Style by Researchers," Department of Industrial Engineering and Management Sciences, Northwestern University, March 1970.
- 70/13 Albert H. Rubenstein, "Some Notes on the Data Requirements for the Longitudinal Study of Development of Information Searching Style by Researchers," Department of Industrial Engineering and Management Sciences, Northwestern University, March 1970.
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- 68/26 Stephen C. Hill, "Swimming with Sharks:" Techniques of a Multimethod Approach to Concept Validation, Human Organization, Vol. 29, No. 4, Winter, 1970, pp. 323-337.

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- 67/35 Gustave J. Rath and David J. Warner, "Infosearch: Studying the Remote Use of Libraries by Medical Researchers," Proceedings of the American Documentation Institute, Annual Meeting, Vol. 4, Thompson Book Company, Washington, D.C., 1967, pp. 58-62.
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- 67/1 David Werrer, "Real Time Data Collection of Information-Seeking Behavior: Two Methods and Results," Department of Industrial Engineering and Management Sciences, Northwestern University, January, 1967.

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Continuation of Abstract

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