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Technical-Abstracting Fundamentals.

III. Publishing Abstracts in Primary Journals†

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Papers included in journals have long been the primary medium for the first publication of technical information. Indeed, it is their evergrowing number that has accelerated research on ways to alert scientists and engineers without asking them to attempt the impossible task of scanning all the pertinent journals for themselves. Table-of-contents bulletins, computer-produced permuted keyword indexes, and even computer-based profile-matching services have come into existence to challenge traditional-style abstracting journals and reviews as vital supplements to the amount of journal reading that individuals must still do for themselves.

Later papers in this series will examine the role of these alerting media. This paper, however, will look at the primary journals themselves, first to see how they are responding to the challenge of increased competition for the limited time of readers; then to concentrate on modern aspects of one of the methods long used to assist journal readers—publishing abstracts with the original papers; and finally to look at such other important roles of abstracts as publication instead of papers, with full versions available in some form from a central source.

Structuring Journals.—Editors of technical periodicals have always done more than simply receive papers and have them typeset, printed, and distributed in issues of their journals. Technical-society editors, in particular, have created exemplary systems for reviewing papers for novelty, accuracy, completeness, and clarity, prior to acceptance. The editors of technical-business magazines ("trade journals") have sought out authorities to write original articles, and have concentrated on clarity of presentation.

In laying out issues of their publications, editors of journals have been concerned, within budgetary limits, with such matters as using readable and attractive types and page formats; arranging papers in some logical sequence; balancing papers with brief news items and advertisements; and other devices that will encourage the peruser to read everything in the journal that is useful (or can be made to appear interesting) to him. Color, catchy makeup, artful placement of pictures, clever titles, and lively topic headings are the hallmarks of at least the technical-business magazines,¹⁴ sometimes consciously combined with other treatment of the texts in a manner termed "structuring".³

As is now evident, the inclusion of an abstract with a paper is a structuring device, albeit one that has often not been recognized as such or employed to best advantage.

Properly used, structuring is a valuable service. Readers appreciate such devices when they concentrate and clarify the messages of individual papers. But when graphic overselling causes them to read papers that are of little value to them, readers can only become resentful.

What is present, here, is the struggle on the part of individual editors to increase the readership of *their* journals, each of which presumably exists to serve a unique demand. This is a struggle that sometimes runs head-on into the need of readers for gaining pertinent information in the smallest possible unit times.

Traditional Role of "Author Abstracts."—Many technical-society journals have traditionally published an abstract written by the author on the first page of each paper. This abstract serves two purposes. It helps the scanner of the journal to decide whether or not to read the full paper immediately, and it often imparts to the less-interested reader enough of the paper's unique infor-

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mation to remind him of its existence at a later date if it then becomes needed.

Despite these worthy purposes, the practice of publishing good abstracts with the original papers has until recently been receiving less and less real attention. Actually, journals fighting for readers have sometimes displaced abstracts with subtitles and other structuring devices that have more "eye appeal." In journals short of funds or editorial time, abstracts have disappeared without any replacement.

The trouble with traditional "author abstracts" is that nobody (or almost nobody) in the journal-publishing sequence has considered them really important, at least until recently. No one has considered working on the abstract as important as something else that he could be doing.

Authors of technical papers rarely give the writing of their abstracts as much attention as they give the full texts. Furthermore, authors of technical papers are not known for their exceptional writing ability even for texts of conventional length.

Similarly, paper reviewers and journal editors have seldom given abstracts even a small part of the thorough analysis and revision that they grant to the papers themselves, a fact that has been obvious to regular readers. Reviewers are more concerned with facts than with presentation, and they rarely are experienced writers or editors of abstracts. Editors of many journals have concentrated more on structuring tools that are physically more attractive than abstracts.

In the past, most editors have not included any requirements for writing abstracts in the style rules that they provide to prospective writers of papers. In a collection of writing instructions for 53 journals to which Esso Research authors commonly contribute papers, only five journals included even a sketchy description of abstract-writing requirements.

Recently, some editors have begun collecting abstracts in an early (attention-getting) section of their issues for reader-scanning use; in these sections, however, "advertising" of the papers occasionally takes the place of balanced description and technical detail.

Part of the blame for the unsatisfactory state of the author abstract resides in a general failure to recognize that good abstracts cannot be written by everyone; indeed, that good writers of abstracts are fewer in number than good writers of papers. If this is accepted and understood, the need for improved cooperation among authors, reviewers, and editors will be more obvious, and there will be less evasion of responsibility. There is some evidence that this is happening.

Additional Roles for "Author Abstracts."—Publishers of some secondary journals have for years used author abstracts, where available, with virtually no alteration. Their reasons have ranged from economic necessity to the sincere belief that the author can summarize his work more clearly and completely than anyone else. At the least, they hold that the authors will not leave out the chief findings, as sometimes happens when abstracts are prepared by others.

It is interesting to note that there is a trend toward increased use of author abstracts even among such staunch advocates of expert-written abstracts as *Chemical Ab-*

stracts. This world-famous abstracting journal is getting assistance from some full-paper journals. Thus, the "Guide for Authors" in the *I&EC Product Research and Development* quarterly part of the *Industrial and Engineering Chemistry* complex states that the authors' briefs published with the papers are now also used directly for *Chemical Abstracts*; it therefore asks for "a clear, concise (100 to 150 words) summary—informative rather than descriptive—giving scope and purpose, methods or procedures, significant new results, and conclusions." Authors are urged to "write for literature searchers as well as journal readers."

Another phase of the use of "author" abstracts in both primary and secondary journals is the very interesting program instituted in 1961 by the American Institute of Chemical Engineers.⁸ It urges chemical-engineering journals to publish author-prepared abstracts that are accompanied by key words for use in personal and organization information retrieval files. Abstracts and accompanying key words are currently published in *Chemical Engineering Progress*, the *A.I.Ch.E. Journal*, and *Hydrocarbon Processing and Petroleum Refiner* in formats styled for clipping and pasting on 3 × 5-in. cards.

Chemical Engineering joined this program in 1963, although it does not publish a conventional abstract. Its view is expressed as follows: "by logical grouping of key concepts with verbalized role indicators, the published list of concepts will serve as an easily scanned and comprehended abstract of the article."⁴

A similar program is now under development by the Engineers Joint Council,⁸ for application to all engineering journals. Indeed, during the week of March 12–16, 1962, 45 technical editors from engineering journals were trained in abstracting and indexing under its auspices, with abstracting taught by one of the authors of this paper (H. Owen). Another course is planned for 1963.¹⁴

Several journals in fields other than chemical engineering have begun to apply this program.⁸ Use in *Electrical Engineering* has been described in some detail.¹²

Emphasis in most of these programs, to date, has been largely on the information-retrieval aspects—on the development of thesauri and techniques for applying them. Recently, however, some of the journals have been paying more attention to better graphic presentation of the abstracts and to their writing.

Both *Hydrocarbon Processing* and *Chemical Engineering Progress* collect their abstract-index "cards" on a separate page in an early portion of each issue, both to avoid forcing readers to cut into the articles⁸ and for contents-scanning use. *Hydrocarbon Processing* actually calls its section, "A Quick Look at This Issue," with the suggestions: "Check those you want to read first" and "Clip those you want to file." *Chemical Engineering Progress* calls its section, "CEP Keywords/Abstracts." The *A.I.Ch.E. Journal*, however, scatters its "Information Retrieval" cards on partial pages in the back portion of each issue.

No standard format for these cards has so far been agreed on by the various journal editors. As may be seen in Fig. 1, *Hydrocarbon Processing* begins its card with a title-first abstract, follows with the list of key words, and concludes with a highly condensed reference (including authors but citing only the first page number

Now Make Naphthalene from Gas Oil . . . Naphthalene can now be made from gas oil by extracting 99.5-percent aromatic cut. Desulfurization of extract, before hydrodealkylation, results in high-purity naphthalene with less than 30 ppm sulfur. Plant with 50-million-pound-per-year capacity costs about \$3.8 million.

Key Words for Indexing: Acids/Inorganic/, Amines, Aromatics, Clays, Conversion, Costs, Dealkylation, Fuels, Gasoline, Hydrocarbons, Hydrogen, Hydrogen Sulfide, Naphthalene, Reactors, Scrubbing, Sulfides/Inorganic/, Sulfur, Treating.

Ref: Barbor, R. P., HP/PR 41, No. 10, page 156, (1962).

Fig. 1.

Belowground storage of liquefied natural gas, Eakin, B. E., and C. G. von Fredersdorff, Chem. Eng. Progr., 58, p. 46 (November, 1962).

Key Words: A, Methods-7, 8, Storage-8, 9, Belowground-, Design-8, Costs-7, 8, Estimating-8, Heat Transfer-8, 9, Transferring-8, 9, Studying-8, Construction-8, Natural Gases-9, Liquefied-, Fluxes-7, 9, Stresses-7, 9, Thermal-, Tanks-9, 10, Hydrocarbons-9, Liquefying-10, Caverns-9, 10, Models-9, 10, Concrete-10, Loads-6, Thermal Properties-6, Physical Properties-6, Properties/Characteristics-/6, 7, Soils-6, Cycles-6, Rates-7, Liquefying-, Distribution-7, Temperature-, Input-7, Heat-, Economics-7.

Abstract: The various techniques for belowground storage of natural gas are reviewed. Belowground concrete tanks have an economic advantage over conventional tanks. The effect of this advantage on the cost of LNG is illustrated. Results of calculations and experiments on heat flux and properties of structural materials at low temperatures, and the general design of a belowground concrete tank, are given.

Fig. 2.

for the paper). *Chemical Engineering Progress* (Fig. 2) leads off with the title and other reference data (again with only the first page number), follows with the list of key words, and concludes with the abstract—a style not as conducive to scanning. *The A.I.Ch.E. Journal* (Fig. 3) and *Electrical Engineering* both begin their card with a list of key words, follow with the abstract, and conclude with the reference; the former also cites only the first page number and does not include the title of the paper; the latter gives a complete citation.

It would be unfair to criticize these programs in great detail at this early stage in their development. The quality of the published abstracts and the per cent that are informative instead of simply indicative have improved materially in the past year, although there is room for much more progress; the 125-word maximum length of the abstract is no barrier to writing good informative abstracts. The improvement already shown is evidence of increased attention by journal editors, who have so far done all the work, although the goal still calls for authors both to write good drafts of the abstracts and to list the appropriate key words.

The extent of use of the abstract-index cards by individuals and others (organizations, secondary journals) is not yet known; however, the impact of this program on the habits of chemical engineers is being studied by Herner and Company under the sponsorship of the National Science Foundation.⁸

Key Words: Heat Transfer Coefficient-7, Condensation-8, Immiscible Liquids-8, Water-5, n-Heptane-5, Methanol-5, Carbon Tetrachloride-5, Benzene-6, Temperature Difference-6, Composition-6, Condenser-10.

Abstract: Heat transfer coefficients for condensing vapors of the immiscible systems benzene-water, n-heptane-water, carbon tetrachloride-water, and methanol-heptane have been measured on a short vertical surface. Three types of condensation were noted: film drop, film lens, and channeling. An explanation based on the concept of the spreading coefficient is proposed for these phenomena, and correlations based on modifications of Nusselt's equation are made for the different mechanisms.

Reference: Akers, W. W., and M. M. Turner, *A.I.Ch.E. Journal*, 8, No. 5, p. 587 (November, 1962).

Fig. 3.

Publishing Abstracts Instead of Papers.—The idea of publishing abstracts in journals *instead of* full-length papers is not a new one. Indeed, the American Documentation Institute has been a pioneer in this area, inaugurating its Auxiliary Publications Program in 1937. This service has mostly been used to deposit bibliographies, charts, and tables that are considered by an editor to be too extensive to accompany a normal-length paper, but the program can also be used to deposit the entire paper if its abstract is appropriately published and is keyed bibliographically to the deposited document (including citation of price).^{1,5,11}

Editorial motives for using such a program have usually involved financial inability to publish full versions of all available papers.

Use of a central depository from which the full texts may be obtained is part of most proposals^{2,7,10}; only a few^{10,15} suggest reliance on obtaining copies from authors. The depository makes the full text available as microfilm, as photocopies, from stored copies of the paper, etc. For example, the ADI Auxiliary Publications Program provides microfilm or photoprint copies, whereas the Society of Automotive Engineers uses a complex scheme involving lists of preprints ("separates"), extended digests published in the *SAE Journal* and keyed to availability of these full-length preprints, and publication of certain papers in its *Transactions*.

As discussed at the 1962 Annual Convention of the American Documentation Institute, some of the very real problems facing "auxiliary publication" are: (1) how to accord adequate recognition to the authors of documents that are abstracted-deposited instead of conventionally published, *i.e.*, how to convince authors that this is a civilized way of publishing, one for which they will be given full credit by publish-or-perish institutions; (2) how to provide rapid access to the full texts when journal readers discover that they need them; (3) how to provide adequate keys to the information deposited, beyond the initial abstract—perhaps listings in appropriate indexes, publication by the central depository of an index to its holdings, etc.; (4) whether there should be a single depository or one for each discipline or "mission"; and (5) how to obtain publishable abstracts that will not create complete opacity.

Nevertheless, central-depository programs that do not involve announcements (abstracts) in conventional journals are already in full-scale, widely-accepted use for theses, government reports, translations, etc. These documents are announced in periodicals devoted exclusively to abstracts, such as *Dissertation Abstracts*, *U.S. Government Research Reports*, and *Technical Translations*.

Studies are in progress to increase the utility and use of the American Documentation Institute's program. It is also interesting to note⁶ that the Board of Directors of the American Chemical Society recently requested the Director of The Chemical Abstracts Service to "study the possibilities...of a literature service which would distribute on request and for a fee technical or scientific articles available from a central depository."

Journal editors will undoubtedly proceed with caution here, to avoid having their assignment of papers to central depositories cause authors to seek creation of new, un-

needed, but less-arbitrary journals. Nevertheless, the publication by journals of abstracts instead of full papers will probably grow considerably in the next few years, since the number of available papers should continue to outstrip both available funds and the ability of individuals to cope with more and bigger journals.

Publishing Abstracts in Advance of Papers.—The practice of publishing abstracts prior to the presentation or publication of papers is a venerable one. These abstracts are often part of programs distributed before the meetings, e.g., those of the A.I.Ch.E. For large meetings, they may be published in booklet form, as by the American Chemical Society. In addition, these "announcement" abstracts may be published in appropriate sections of subject-related journals, e.g., *Rubber Age* and *Rubber World* for the papers of the American Chemical Society's Division of Rubber Chemistry.

The abstracts are usually published exactly as they are made available to the sponsor of the meeting; thus, many are brief annotations, some are indicative abstracts, and others are informative abstracts. Although the sponsor of the meeting often issues rules for author preparation of these abstracts, most sponsors do not edit the ones that do not comply.

A new alerting service begun by *Industrial and Engineering Chemistry* involves printing abstracts of manuscripts as soon as the latter are submitted for possible publication, and announcing the availability and cost of photocopies of the manuscripts (Fig. 4). To make this feasible, authors of papers are required to provide a "short summary of 35–40 words" in addition to the usual abstract (100–150 words), so that the "short summary" can be published in the "Research Results" section of *Industrial and Engineering Chemistry's* monthly edition "to enable its reader to decide whether or not he should purchase a pre-publication copy of the manuscript as submitted." Manuscripts continue to be available either until the paper is published or up to 90 days after the manuscript is withdrawn from consideration.

For the physicist, each issue of *Physical Review Letters* gives abstracts of papers scheduled to appear in the next issue of *The Physical Review*.

Publishing Abstracts to Call Attention to Related Recent Papers.—Quite a number of journals have long published abstracts of recent papers in other journals related to their fields of interest, a practice that has occasionally led to the birth of full-length secondary journals. Usually, this is considered an alerting service, not necessarily one that has information-retrieval overtones. Impetus to this idea has been given by current

Behavior of Isocyanate Terminated Prepolymers in the Presence of Various Catalysts

J. W. Britain, Mobay Chemical Company

The behavior of a tolylene diisocyanate-terminated prepolymer in the presence of 73 isocyanate-hydroxyl reaction catalysts is reported. Some of the powerful catalysts cause the prepolymer to react with itself by the formation of allophanate groups or cyanurate rings and, finally, to gel. Other catalysts had little or no effect on the prepolymer.

Ms. 62-132 9 pages, including 5 figures, 11 tables \$1.00
Fig. 4.

BEHAVIOR OF ISOCYANATE-TERMINATED PREPOLYMERS IN THE PRESENCE OF VARIOUS CATALYSTS

The reaction product of a poly(oxypolypropylene) triol with an excess of a diisocyanate was prepared, and its behavior in the presence of various isocyanate-hydroxyl reaction catalysts was observed. Some of the powerful catalysts for the isocyanate-hydroxyl reaction caused the prepolymer to react with itself by the formation of allophanate groups or cyanurate rings and finally to gel. A list of the type catalysts in a roughly descending order of catalytic activity toward gelation of the prepolymer is: strong bases, Pb, triethylenediamine, *N*-alkylethyleneimines, Fe, Sn, R₂Sn, Co, Ti, R₂Ti, and tetramethyl guanidine.

J. W. Britain, Mobay Chemical Co., New Martinsville, W. Va.

Fig. 5.

interest in the Russian technical literature coupled with a growing unwillingness to embark on additional extensive programs for complete translation.

The monthly edition of *Industrial and Engineering Chemistry* publishes "Briefs" of papers that appear in its research quarterlies. For example, abstracts of papers in the December, 1962, *I & EC Product Research and Development* appeared in the December, 1962, issue of *Industrial and Engineering Chemistry*. Each of these briefs (Fig. 5) is an editorial condensation of the author-prepared abstract that appears on the first page of the full paper.

Discussion.—Paper II in this series has set forth the principles and practices for writing good abstracts. These apply full force to the preparation of abstracts to be published in primary journals, especially if these abstracts are to serve multiple purposes. For example, use of an informative abstract that has a good findings-oriented topical sentence has many advantages, including aiding the reader to determine whether he must read on, providing the journal editor with highlighting material for "What's New" pages, and affording enough key words for many indexing purposes. Stress therefore needs to be placed on the use of a good topical sentence and on having it stress the new material or the salient point of the paper.

The following abstract of a recent article illustrates these points:

Coupling pilot-plant operation with a computer process model results in shorter development time and improved commercial designs. Pilot application should always be preceded by process-model development work on a research scale via computer or manual means. Analog computers can easily determine reaction mechanisms, but digital computers are preferred if there are large blocks of data to be analyzed. Other technical considerations in pilot-plant design include obtaining physical and chemical similarity to the commercial operation, and securing adequate mass and heat transfer data. The differential-equation method is preferred for determining the important criteria in scale-up.

The topical sentence italicized here is directly adaptable for use on a lead page of newsy items or as a lead-in to the full paper in the journal. A few editorial words on such items as the company doing the work, the actual process used in the article, or the relationship between the article and the state of the art would complete the picture.

This topical sentence contains enough key words for many indexing purposes. Indeed, accumulation of such

topical sentences could yield indexes periodically prepared *via* computer permutation. Alternately, an indexer doing the task manually may wish to cross-reference this article under "pilot plant," "computing," "process model," "development," and "design." Editors of journals may wish to consider either approach for preparing their annual indexes.

Whether an abstract should be published on the first page of the paper or collected in a reader-service section for scanning is still the prerogative of the editor, of course. If he collects the abstracts in one place he is free to use other structuring devices—subtitles, highlights, pictures, etc.—on the first page of the paper. If he publishes the abstract on the first page of the paper he can call attention to "What's New" by the use of topical sentences or other phrases, as desired.

As mentioned earlier, the quality of the abstracts published in primary journals depends ultimately on the earnest effort of the original authors, the attention of the reviewers (if any), and the willingness of the journal editors to devote whatever additional effort is needed to edit the abstract for maximum information transfer. Good abstracts cannot be expected uniformly other than from those skilled in the art, and even these need to be edited. Therefore, cooperation among paper authors, reviewers, and journal editors is mandatory if equivalent results are to be obtained.

In the final analysis, however, *the responsibility for publishing good abstracts in a primary journal is that of the editor of that journal.* Although it is up to the author to pick key points from his paper to convince his fellow professionals (including reviewers) that he has a case, it is up to the editor of the journal to see that the quality of the published abstract is that which he sets for other portions of his journal.

The responsibility for quality control of a journal is always vested in its editor. He is the one who attempts to see that the articles published are aimed at and written for his particular audience. The editor goes to great pains to keep up-to-date with his audience. He attends technical meetings, makes plant trips, and joins in informal discussions. He maintains a broad view of the field. Part of his task should be to see that both the abstract and the article uphold the standards of his journal.

The response of engineering-journal editors to the plans of the Engineers Joint Council and the steadily-improving quality of the abstracts being published in chemical-engineering journals seem to testify to an increasing willingness on the part of journal editors to improve the quality of the abstracts they publish. This, it is hoped, will eventually lead to the inclusion of special directions and guidelines on how to write good abstracts in each journal's instructions to writers of papers. It should also lead to journal-editor willingness to edit author abstracts as much as is needed: to provide topical sentences, to

polish the writing, add important information, etc.—as Isotta⁹ puts it, "to ensure abstracts that are reliable, impartial, and informative."

Many journal editors are presently unfamiliar with the basic fundamentals of abstracting. That is why cooperative efforts crossing disciplinary lines are needed to find a common ground among readers, authors, editors, and abstracting professionals. The day when a machine can solve the problem—write communications-oriented abstracts—is neither here nor near. Only good will and hard work by all—continued hard-work—will result in the publishing of good abstracts in primary journals. This is "a consumation devoutly to be wished."

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