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# Technical Editing and the Effective Communication of Scientific Results

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**Abstract.** The communication of scientific results—whether for professional journals, poster sessions, oral presentations, or the popular press—is an essential part of any scientific investigation. The technical editor plays an important role in ensuring that scientists express their results correctly and effectively. Technical editing comprises far more than simple proofreading. The editor's tasks may range from restructuring whole paragraphs and suggesting improved graphical aids to writing abstracts and preparing first drafts of proposals. The technical editor works closely with scientists to present complex ideas to different audiences, including fellow scientists, funding agencies, and the general public. New computer technology has also involved the technical editor not only with on-line editing but also with preparing CD ROMs and World Wide Web pages.

## WONDERLAND, THE RESEARCH LAB, AND THE TECHNICAL EDITOR

In *Through the Looking Glass*, Humpty Dumpty grumbles about the injustice of having only one day a year to celebrate a birthday. "There's glory for you!" he declares. "I don't know what you mean by 'glory,'" Alice says. "I meant 'a nice knock-down argument,'" Humpty replies. After Alice objects to this definition, Humpty retorts: "When I use a word, it means just what I choose it to mean—neither more nor less" (2).

Alice might be viewed here as a prototype editor. Certainly, she has carried out one of the most prominent tasks of the editor: correcting incorrect vocabulary. More significant, she has undertaken one of the most daunting responsibilities of the editor: dealing with sometimes-recalcitrant authors.

While Alice can simply leave Humpty to his world of fantasy, however, the editor in a research institution such as Argonne National Laboratory does not enjoy that luxury. She must ensure that the scientists and engineers express their results correctly and effectively.

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## THE EDITOR'S TASKS

When an Argonne editor is given a manuscript, she is frequently asked to "proofread it." Often, this is not what is desired. The confusion arises because "editing involves different levels of revision, depending on the desired clarity and exactness of expression for the document at hand" (1).

### Proofreading and Copyediting

Technically, *proofreading* involves comparing a given manuscript with the typeset result. The task requires an eagle eye, particularly when one is proofing numbers or references. But technical editing comprises far more than simple proofreading.

*Copyediting* is often what the authors mean when they ask an editor to look over a manuscript. Here, at least two levels of effort are distinguished. The first level, called *mechanical copyediting*, involves checking spelling, grammar, and punctuation; ensuring that all the figures and tables are present and properly aligned; cross-checking the table of contents with the text headings; and ensuring uniformity in the references. Additionally, the editor may be asked to check for internal inconsistencies in acronyms, hyphenation, and format; to correct nonstandard word use and punctuation; and to revise misplaced modifiers and sentence fragments.

The second level, called *substantive editing*, may range from restructuring overly complex sentence and incomplete comparisons, rewording passive voice, and reconstructing tables to correcting poorly organized paragraphs and restructuring poorly organized sections. Some editors are also asked to write abstracts, transitional paragraphs, and indexes.

### Peer Review and Quality Assurance

Both proofreading and copyediting are part of the peer review process in many scientific divisions at Argonne. The editor is responsible for checking each manuscript before it is cleared by the Laboratory and then submitted for publication. If the manuscript is accepted, the editor's task is done—unless she is asked to read the proofs. If the manuscript is to be revised and resubmitted, the editor may repeat the copyediting cycle. This peer review process is the principal mechanism of quality assurance in the research divisions at Argonne.

## EXPLOITING NEW TECHNOLOGY

The editor's conventional tools have been a red pencil and dictionary. Today, the editor's toolkit has expanded enormously.

New computer technology has provided the editor with on-line dictionaries and grammar and spelling checkers; with "diff" tools to compare drafts; and with automatic marking capabilities that indicate corrected passages or editorial questions.

Using a PC, Macintosh, or scientific workstation, many editors now receive, revise, and return a manuscript on-line. While some may argue that the personal exchange between author and editor is missing, others note that the turnaround time is improved (an author can, for instance, respond by e-mail to queries that might otherwise have to wait until both he and the editor were in the office). Certainly, paper is minimized.

New tools bring new responsibilities. In addition to the traditional reports, professional articles, and newsletters, Argonne editors are involved in "nontraditional" activities such as

- preparing CD ROMs (3, 4),
- creating World Wide Web pages,<sup>1</sup>
- producing "pogs,"
- conducting classes on oral and written presentations, and
- editing videos.

In each of these media, the technical editor works closely with the scientists, seeking ways to present complex ideas to different audiences—including fellow scientists, funding agencies, and the general public.

## MOTIVATION

The principal "deliverables" of research scientists are reports, journal articles, or conference papers. Since most researchers recognize the importance of publishing their results, the editor usually does not have to motivate the scientist to submit such manuscripts. Nor is there a hard deadline to meet. The editor's chief challenge in copyediting these documents is convincing the

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<sup>1</sup>The home page for Argonne's Mathematics and Computer Science Division, maintained by editor/webmaster G. W. Pieper, recently earned the highest rating (four stars) from the McKinley Group. The ratings are based on an evaluation of each site for depth, ease of exploration, and net appeal.

scientist that no changes are being made to the style, or the ideas, of the writer.

The editor faces an enormous challenge, however, in ensuring that scientists submit other types of documents—for example, a one-page “highlight” or one-paragraph description of a recent accomplishment, or (most dreaded at the national laboratories) the field work proposals (FWPs).

How does an editor motivate a scientist to provide the needed material by the stated deadline? One method that has proven surprisingly successful is humorous verse. The idea is adapted from industry, where humor workshops have spurred productivity by as much as 15% (5). Humor reflects friendliness and conveys a personable tone than a demanding response to a deadline; it thus lightens the task for both the writer and the editor (6).

## THE EDITOR'S FUTURE

As personal computers began providing editing facilities, some pessimists immediately cried that the role of the editor was dead. Not so: it simply changed.

Similarly, some may worry that being an editor is in a dead-end job. Certainly Argonne gives the lie to this. At the Laboratory, former editors hold a wide variety of positions, including

- Managing editor of the *Journal of Automated Reasoning*
- Assistant division director
- User program administrator, and
- Division director

## AN ESSENTIAL ROLE

Is the technical editor a luxury? Certainly—if one can assume that the scientific writer is methodical and painstaking, objective about his prose, appreciative of the importance of clarity, and aware of the rules and formulas of writing. Realistically, however, we must admit that the technical editor is far better equipped with these skills and attitudes.

And since writing is so important, since scientists “are judged by the contents of [their] reports” (7), a research laboratory such as Argonne relies heavily on the technical editor to maintain its excellent reputation.

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