Better Written Journal Papers—Who Wants Them?

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I'm a little tired of better technical writing being proclaimed the panacea for most scientific ills. I sometimes wonder what comes of all the talk about improving the presentation of scientific research, except to keep people like me in a good job, and to give critics opportunity to vent spleen.

The technical literature is literature only in the sense that any string of words is literature. Journal articles are a form of data recording; journals are archival. So, for papers that are to appear in journals of highly specialized fields for archival purposes, who cares how they are written? That all the important data and relevant information are included and fit, yes; but the writing? Standard, accepted sci-tech gobbledygook is acceptable and expected. It's all that is wanted.

Journal editors wouldn't accept, nor would the referees, a paper in plain English. It would be too long. It would not ring true. It wouldn't be bedaubed with the beloved, viscera-satisfying jargon. It wouldn't have the ring of *Polymer Chemistry*, or *Physical Review*, or *Nature*. It would sound—horrors!—like some of those simple-minded pieces in *Physics Today* or *Scientific American*.

Do researchers want to write clear literate papers, instantly crystal clear to all readers? They do not. They want to get a paper published that will impress their peers. And if nobody else understands, so much the better.

Americans aren't going to learn to write much better until words—what they say—become as important as what they do. They were for the Greeks; they were for the Elizabethans; they were for the French when France was the glory of Europe. Most Americans don't think that the writing style, or the words, of a report are as important as what it contains. A few give lip service to a paper's literary value, but most feel it's the research that counts. Are they wrong? It depends on your set of values. Those who do care enough to work harder at their writing do better writing.

There are two types of technical writing from the standpoint of the reader: (i) "captive" writing, which the reader will read no matter how it is written because he needs or wants the information, and he may not even be aware whether it's well or badly written; (ii) writing that has to motivate the possible reader to at least scan the material, thus competing with all other written matter confronting him. Writing for journals is captive writing: those who have to read it will do so no matter how badly written it is. Writing for *Scientific American*—or *Atlantic* or *Harper's* or the *American Scholar*—is writing, not documenting the results of a high-energy particle experiment for *Physical Review*.

Writing is not the only activity that can force the researcher into explicit statement; it is only one means of organizing, expressing, explaining research results. Having to present one's work to one's peers, or to a boss, forces formal organization and expression. So does making a documentary film, or explaining the work to a public relations man who is writing up a press release, or preparing a discussion for a graduate seminar. And however you present it, you'll organize, express, explain the research differently. Words won't always do it; tables and illustrations won't always; moving pictures are sometimes required. Frequently, to those without adequate background, an item can't be explained unless the background is somehow sketched. An expert may be required to come consult. Growth in the number of consultants and in the importance of symposia shows the need for face-to-face exchange.

Most writing has always been mostly bad. What will be the influence of this bad writing on the science of the future? Nil. The data will have to be reinterpreted in terms of the techniques and concepts reigning at that time; and you'll have that difficulty no matter how well the piece is written.

Writing, we are told by many, will make you a better thinker. Better do your thinking before you do your experiment. You can't replan it and reperform it when you plan your article. The paper should be planned when the experiment is planned—indeed, it has to be: whatever you plan and perform is what you have to write about. Better writing won't lead to better research.

Technical writing isn't any more logically systematic than research itself is; and how is research done?—by hunch, guesswork, seat-of-the-pants decisions as often as it is by thorough thinking through. Technical writing is a knack, a talent with words, which through training and practice has become a skill. Good technical people who are poor writers can be made better writers, but probably not good ones: that would require too much training, and they have neither the time nor the interest.

Writing is important, so is mathematics, and most technical people are admittedly weaker in both than they wish they were. Neither they nor anybody else is happy about the situation. Where a researcher or an engineer needs mathematics, he finds a mathematician, or the work is given to the person in the group who can do the best with it. The same thing holds true in writing up the paper: let the best writer in the group draft it, then take it to an editor in your organization. Or if your outfit doesn't have a publications group, other members of the team will have to polish it.

How do you find or train a writer of good technical prose? One way is to find the man or woman in the group who does the best writing and prevail upon him to do the writing. As he does more writing he'll get better. If he's a skilled writer, he may not mind: we all like to exercise our skills.

And reasonably good technical writers among technical people usually have a literary interest. They are readers of history, or mysteries, or even westerns, or are fervent theatergoers, or readers—or writers—of science fiction or limericks. If this person were to ask me how to improve his technical

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writing, I would tell him to work at his reading, to spend 2 or 3 years doing some nontechnical reading: read novels, plays, short stories, poetry, travel, history, current events; read argumentation and controversy, humorous or otherwise; read Standen's *Science Is a Sacred Cow*, or Barzun's *Science the Glorious Entertainment*. Let him read Winston Churchill until the rhythm of Churchillian prose works into his subconscious. Try reading out loud. Try listening to records such as the Oxford prose selections, or the four assassins in T. S. Eliot's *Murder in the Cathedral*, or his *Cocktail Party*. Or try listening to the scads of poetry readings that are available; Lewis Casson reading Tennyson's *Ulysses* and Sybil Thorndike reading the *Lady of Chalot* will haunt you. Read several of the literate books on writing, including technical writing and usage: Strunk and White, *The Elements of Style*; Menzel, Jones, and Boyd, *Writing a Technical Paper*; Vallins, *Good Writing, Better Writing*; Graves and Hodges, *The Reader Over Your Shoulder*; Gunning, *The Technique of Clear Writing*; Flesch, *The Art of Plain Talk*; Gowers, *Plain Words: Their ABC*.

His reading will do him fully as much good as any technical writing course. And if he does indeed conscientiously read more and analyze what he reads for a year or two, he will probably give it three or four and more. He'll be hooked on reading. If his writing doesn't improve, it won't be any worse. And he will have become that surprising, delightful, and all too rare person—the literate scientist.

NEWS AND COMMENT

Post-Apollo: NASA Seeks a Mars Flight Plan

Today, in the wake of the successful Apollo mission, President Nixon and the Congress face a critical question of space policy not unlike that which confronted President Kennedy and the Congress in 1961. For President Kennedy the question was whether the United States should land men on the moon by 1970. Kennedy said Yes. Now it is up to Nixon to say Yes, No, or Maybe to the question of whether to send men to Mars in the early 1980's.

The question now, as then, is whether the United States shall commit itself to a program of manned space exploration which is so ambitious, and so demanding of money and talent, as to overshadow all other space activities—and to constitute, far and away, the nation's single largest venture in science and technology.

While the policy question posed today is similar to that of 1961, the circumstances in which it must be decided are vastly different from those that prevailed when John Kennedy occupied the White House. In 1961, the Soviet Union, having just placed a man in orbit, was ahead of the United States in the technology of manned flight, and this was a politically embarrassing matter. Today it is the United States that is well in the lead. And, today, the space program faces far keener competition for resources than it did in the early years of Apollo. A frustrating and seemingly endless war has led to huge defense expenditures, and a multitude of domestic problems cry for solutions which invariably are costly.

On the other hand, the success of Apollo demonstrates that NASA thus far has not overreached the state of technology. And this, surely, gives greater credence to the agency's claims for the future. A manned expedition to Mars in the early 1980's would involve a round trip of hundreds of millions of miles, as compared to the relatively comfortable 476,000-mile trip taken by the Apollo 11 astronauts. Yet Homer E. Newell, NASA's associate administrator, says that such an expedition would be "no bolder, no more risky" than was Apollo, a program begun even before the United States had made its first manned orbital flight and while NASA was still a fledgling organization.

Thomas O. Paine, NASA Administrator

There is still another major new circumstance almost certain to influence the outcome of the current national deliberations on the future of the space program. For Apollo, NASA built up a big in-house and contractor establishment, an establishment which is now anxious to be given another large mission and the billions of dollars necessary to finance it. Several years hence all of the Apollo flights currently programmed will have been completed and all the orbital workshop activity planned under the Apollo Applications Program (AAP) will have been carried out. What, then, will become of such elaborate NASA facilities as the Manned Spacecraft Center at Houston and the Marshall Space Flight Center at Huntsville if another large program of manned space activities has not gotten underway?

The aerospace industry as a whole looks to NASA for about 15 percent of its business, and some companies, such as North American Aviation, manufacturer of the Apollo spacecraft, have depended very heavily on NASA contracts. The industry's self-interest in the perpetuation of Apollo-type programs is manifest. If there is a "military-industrial complex" behind defense projects such as the Safeguard antiballistic missile, one may safely assume