

Book Reviews

Clarity

How to Write Scientific and Technical Papers. SAM F. TRELEASE. M.I.T. Press, Cambridge, Mass., 1969. xii + 188 pp., illus. Paper, \$2.95. An outgrowth of *Preparation of Scientific and Technical Papers* and *The Scientific Paper, How to Prepare It, How to Write It*. Reprint of the 1958 edition.

Scientific Writing for Graduate Students. A Manual on the Teaching of Scientific Writing. F. PETER WOODFORD, Ed. Rockefeller University Press, New York, 1968. x + 190 pp. \$5.75. Council of Biology Editors Manual.

Scientific Writing. LESTER S. KING and CHARLES G. ROLAND. American Medical Association, Chicago, 1968. x + 134 pp. Paper, \$1.

Practical Technical Writing. RITCHIE R. WARD. R. M. Ohmann, consulting editor. Knopf, New York, 1969. xxii + 264 pp., illus. \$5.50.

These books illustrate the astounding problem of scientific writing: how to achieve clarity. Each of the doctors fails to recognize certain symptoms, and none can completely heal himself. Indeed, the four show that the virus has mutated somewhat in the last decade. Although all the books will surely help their slightly different audiences in some ways, the first two, in their own authoritative prose, set examples bad enough to impair an aspiring writer's vital functions for the rest of his unnatural life.

Trelease's is the worst. This is a reprint of a book a decade old, which itself evolved from two others, in five editions, beginning in 1925. Trelease has become an authority. Woodford reveres him and assigns him as his text. His pages on logic (44-46), on statistics (27-32), and on "Guides to literature" (11-25) do indeed go beyond anything comparable in the other three. But his writing! The growing clarity of the newer books allows some hope that Trelease's will stand as a high-water mark of muddy scientific prose among those who aim to clarify it.

His sentences come in little wooden bits, like Tinker Toys:

Many scientists find it helpful to accumulate a list, in the form of a card index, of promising research problems from which selections may be made. It is advantageous to make a tentative analysis of each subject and to indicate briefly the object, scope, general plan of investigation, and probable nature of the results that might be obtained [p. 1].

This is the empty passive voice of "science." Let's activate:

Many scientists jot down their promising ideas on file cards: object, scope, technique, probable results [17 words for 58].

Too terse? Perhaps. But the tautologies have vanished: "list," "card index," and even "selections" all try to say the same single thing, as do "results" and "that might be obtained." All those unnecessary little *it's*, *is's*, *to's*, *of's* only attenuate the obvious thought. Trelease's first sentence (and indeed every introductory sentence throughout the book) labors the obvious and fumbles the meaning: "In choosing a research problem, special knowledge of a particular field of science is indispensable." "Special knowledge" is not choosing a research problem, *you* are. The whole statement is a tautology, the passive voice of science clearing its empty throat and missing the subject. Naturally, when you pick a problem what you already know is indispensable. I suppose the sentence aimed at something like: "For your research, choose your problem from a field you know."

Woodford illustrates the melancholy difficulties facing the writer who aims to improve scientific writing. He himself has written perhaps the best article yet on the subject, "Sounder thinking through clearer writing" [*Science* 156, 743-45 (1967)], which Ward reprints as a keynote to *his* book. The editors of *Science*, I fear, deserve some of the credit, for the prose of Woodford's own book seems to have come from another and heavier hand. Perhaps he

could not buck the committee. However that may be, he praises Trelease as "the pithiest, the most profound, and above all the most scientific" (p. 7), finding his writing "highly condensed"—though conceding that "students may find it a little indigestible." In short, Trelease's three pages on logical fallacies have so impressed Woodford that he does not notice the very atrocities he cautions against lying bloated on every page. He finds Trelease's indigestibility in "condensation" rather than in his actual gassiness. Woodford cannot recognize the trouble, and cannot cure himself.

Woodford does provide an excellent plan for teaching graduate scientists how to write. But, again, if the students write like the masters, the game is doubly lost. The masters have, to some extent, cleaned out the passive voice of the Treleasean era, but now the virus has mutated into a clotting of nouns as adjectives. Even the "Conference of Biological Editors" has become "the Council of Biology Editors."

Such nouniness—which infects all of our writing these days—may seem insignificant until you see how the editors "improve" a text. Here is one, beginning "Physical fitness tests. . . ." Those words say that "physical fitness" is testing something. But, of course, as you read your way into the sentence, you must shift your understanding of *fitness* from noun to adjective and of *tests* from verb to noun. Language should be clear, word by word—especially on the printed page, where the voice no longer guides.

To be sure, the authors clear out some sludge, but then they delude themselves and their students into thinking that their solution is ultimately clear. Let me give the abomination they correct, then their still muddled version, then a syntactically clear statement, in which no word can mean something else and with tautologies coalesced (I estimate that publication now costs 10 cents a word):

Cardiovascular-functions and general bodily efficiency relationships have formed the subject of a great deal of research in order to gauge the general health of individuals [26 words: \$2.60].

Physical fitness tests rely on the relationship between cardiovascular function and bodily efficiency to provide an index of general health [20 words: \$2.00].

The relation between cardiovascular and bodily efficiency provides a testable index of health [13 words: \$1.30].

King and Roland's *Scientific Writing* hits close to this syntactic mark. Their

program falls short of Woodford's, which would triumph with their verbal acumen. Their advice to the researcher falls short of Trelease's, which they could rewrite in half the space. Their title betrays the promoter, since they really address only medical writers. But since all writing fails in the same way, as wasted words obscure the meaningful, we can concede something to the marketplace. These brief essays, developed in writers' workshops and published in the *Journal of the American Medical Association*, will help anyone bugged by the *is's*, *of's*, and *which's*, the bunched nouns, and the passive wordiness of science. That the authors themselves fail of perfection only underlines the difficulty of cleaning out these stables: "The topic of the passive voice will form the basis of the next communication in this series." ("We shall discuss the passive voice in our next article"—10 words for 17.)

Ward outdistances the other three, as he pursues the writer's problems from "audience" through organization, paragraphs, sentences, and words, with a generous section on all our faults. Ward writes clearly and briskly, addressing the student directly and concluding each section with exercises. He adroitly quotes all kinds of writers, especially to strengthen Woodford's point, which he launches early and well by presenting Woodford's entire essay: *writing clarifies thinking*. Writing is thought—not an aid to thought, or a crutch, or a frill, but thought distilled and crystallized. Except for numbers, we know what we know only through words. We formulate what we know only by writing it out. Ward makes this point again and again, quoting all kinds of men to whom this ultimate linguistic truth has finally come through, among them (p. 64) Charles Darwin:

I have as much difficulty as ever in expressing myself clearly and concisely; . . . but it has had the compensating advantage of forcing me to think long and intently about every sentence, and thus I have been led to see errors in my reasoning and in my observations or those of others.

But even Ward demonstrates the distressing blindness of scientific writers, particularly to the newer opacity of noun on noun. Each of his sections contains an entire essay by someone else, illustrating his topic. After his own lucid prose, he can insert, with approval, an essay groaning with nouns-as-adjectives in such phrases as "utilization of energy sources" and "efficien-

cy of energy utilization." Its title should have warned him: "Energy sources and energy conversion." ("The sources and conversion of energy," in its syntactic clarity, would have been worth the price of the extra word.) Worse yet, Ward himself shows how to write an abstract in the worst possible abstracter's prose: "The applicability of seven published readability formulas for estimating the communicative effectiveness of scientific writing has been studied. The formula scores were compared . . ." ("I have studied seven formulas for estimating the readability of scientific prose. I compared scores . . ."—15 words for 23). He falls into the very pleonasm he deplors.

He would not have done so had he read King and Roland's excellent pages on using the first-person pronoun and

avoiding the passive voice. In fact, Ward says nothing at all about the sins of passivity and anonymity, which, together with the noun as adjective, waste multitudes of words in scientific writing. Writers on scientific writing continue to ignore this devilish trio in one way or another. The best solution with these four books is perhaps this: to use Woodford for your pedagogical outline, and Ward, supplemented by King and Roland, for your text, tearing apart the prose where it will tear to remind your students, and all of us, how fanatically we must work to write clearly, how easily we waste words, time, space, patience, intelligence, and money.

SHERIDAN BAKER

Department of English,
University of Michigan, Ann Arbor

Singing and Dancing: A Cross-Cultural Survey

Folk Song Style and Culture. A staff report on cantometrics presented at the Washington meeting of the American Association for the Advancement of Science, Dec. 1966. ALAN LOMAX. With contributions by the Cantometrics Staff, Bureau of Applied Social Research, Columbia University, and with the editorial assistance of Edwin E. Erickson. AAAS, Washington, D.C., 1968. xx + 364 pp., illus. \$16.75; members' cash price, \$14.50. AAAS Publication No. 88.

For 80 years anthropologists have been trying to develop the cross-cultural survey method. In cross-cultural survey they study a large, worldwide sample of tribes and nations, mostly primitive tribes. They look for statistical correlations and try to analyze them. They hope thus to test hypotheses about human behavior and human ways of life with almost the rigor and confidence of a controlled laboratory experiment. Here are a few of the questions they have tried to answer in this way: Do varying ways of making a living make for correlated varying types of family organization and even correlated varying concepts of kinship? Do variations in systems of infant care make for correlated variations in types of personality among adults? Do variations in the amount of population clustering make for correlated variations in the social and occupational complexity of tribes and nations? Do these variations in social and occupational complexity in turn lead to correlated variations in the whole level of civilization

of those tribes and those nations? And do variations in level of complexity among those tribes and nations also lead to correlated variations in the complexity of their styles of art?

The first attempts at such surveys had serious defects. Critics pointed to bias in the samples of tribes and nations and to confusions of unit definitions—what is a tribe? Critics pointed to bad data in the field reports of explorers, missionaries, and anthropologists. Critics pointed to confusions in concepts arising from studies trying to classify native behavior but using European casts of thought and to anomalies of comparison in which a few thousand wandering food gatherers like the Yahgans of Tierra del Fuego were likened to a great modern nation like the English. Critics pointed to the use of mere statistical correlations as tests of theories of cause and effect and derided studies which ran dozens and dozens of correlations in order to report triumphantly one or two "statistically significant" at the 5-percent level of "confidence." Critics such as Franz Boas, for two generations the immensely influential dean of American anthropologists, dismissed the whole enterprise as a waste of time because it had no way of telling correlations reflecting underlying patterns of human behavior from correlations reflecting mere accidents of common history—the problem posed for this method at its very outset by Sir Francis Galton.

Probably no cross-cultural survey has