work); the third, an objective genitive (*maintain constancy*); the fourth, a partitive again (he mumbled a little here about a descriptive in reverse); the fifth, a subjective genitive (*regulators operate*) with some possibility of being regarded also as an objective genitive (*operate regulators*). The human mind can stand just so much.

On a less learned plane, I am convinced that, with a few exceptions, a succession of three *of* phrases, or five of any kind, sets up a rocking-chair rhythm so inimical to ordinary prose that it destroys the reader's concentration on meaning. I first became aware of this fact several years ago when I was analyzing some 2000 revisions of various writers; since then I have seen no evidence that alters this view and I have seen a good deal that reinforces it. Several interesting *of* sentences, for instance, appear in Fowler and Fowler's *The King's English*:

> The signs of the times point to the necessity of the modification of the system of administration.
>
> The first private conference relating to the question of the convocation of representatives of the nation took place yesterday. (*5*)

The authors revise the first sentence to

> It is becoming clear that the administrative system must be modified.

And the second to

> The first private conference on national representation took place yesterday. (*5*)

Science writers' fascination for the passive is deplorable but understandable. For describing experiments, the passive (without the doer) sometimes performs even more efficiently than the active (*6*). Too, editorial demand for objectivity may force a writer into abandoning "I," which eventually leads him to "the writer," which eventually generates self-consciousness, which finally sends him slinking to the passive. Thus, editorial policy and the passive's efficiency in specific circumstances may develop in the writer a passive-psychosis, a state in which the patient cannot differentiate between a good passive and a bad one. However faulty this diagnosis, something certainly causes the disease, and to cure it a writer might well consider every passive sick until he proves it healthy.

To end this oracle-like piece realistically, I must admit that the preceding facts, even if heeded, will not guarantee entry into prose heaven. On the other hand, they do identify certain major snares and temptations along the way.

References and Notes

1. All examples, unless a source is given, are from *The Scientific Monthly*. For obvious reasons, I am not citing the titles of articles or the issue, but I will supply this information to anyone who is interested.
2. A minor comment: *the* (before *working*) and *on the job* are unnecessary.
3. Robert J. Geist and Richard Summers, *Current English Composition* (Rinehart, New York, 1951), p. 419.
4. Occasionally an adjective will contain the verb idea: "Clovers and alfalfa *have a greater beneficial effect on* the soil than any of the other legumes." (benefit the soil more) However, the construction seems rare. This example comes from a student paper.
5. H. W. Fowler and F. G. Fowler, *The King's English* (Oxford Univ. Press, London, 3rd ed., 1931), p. 15.
6. This statement does not mean, incidentally, that the passive minus the doer can do no evil; on the contrary, an unscrupulous or careless writer can easily use it to retreat into remoteness with an unsubstantiated "It is generally thought that . . .," a pronouncement that a comatose reader may accept without the quiver of a brain cell. But to my lay eye, science researchers do not take refuge in the passive unscrupulously.

Does Writing Make an Exact Man?

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IN some parts of the world nothing brings the malign effects of the evil eye upon persons and things more quickly than perfection, or surpassing excellence, or even unqualified praise of them. A somewhat similar idea used to flourish among the Navajo women, who averted ill luck by weaving intentional imperfections into their rugs. Authors and editors do not have to take such precautions, for blemishes defy the utmost efforts to keep them out of manuscripts. A line in Lowell's *Fable for Critics* seems to reveal a psychological need for our inevitable lapses:

> One longs for a weed here and there, for variety.

And in *Idylls of the King,* Tennyson apparently decries perfection:

> He is all fault who hath no fault at all.

We look upon the Greek and Latin classics as the acme of perfection and as models for the molding of literary style and taste, but not all the ancients wrote supremely well. Numerous imperfections that one now finds in manuscripts, such as errors of fact, lapses of memory, faulty syntax, triteness, dud figures of speech, obscurity, verbiage, and pomposity, had counterparts in antiquity, so that a modern editor has to do with age-old problems.

Any critical person can cull from his general reading examples of errors of fact and lapses of memory. An informative article in a good magazine begins inauspiciously with the remark that *gastropod* is a word of Latin derivation. And the latest revision of a manual of botany lists numerous names of Greek origin under the heading "Index to Latin Names of Families, Genera and Species." In a recent issue of our most

literary magazine, a gifted scholar speaks of *Webster's New World Dictionary,* a glaring inadvertence that all readers of the manuscript and proof should have noticed. (The word *international* subconsciously suggested to the author the partial synonym *world.*) Another careless error was that of a columnist who, although surrounded with reference books, ascribed to Socrates (instead of to Protagoras) the saying that man is the measure of all things.

There are two errors that may rightly be called famous. In his sonnet "On First Looking into Chapman's Homer," Keats puts Cortez (instead of Balboa) on a peak in Darien to view the Pacific Ocean. Still better known is Dr. Samuel Johnson's mistake in defining "pastern" as "the knee of a horse."

To go back still farther, we find Greeks with faulty memories assigning to Homer familiar verses that occur in later writers.

We would not have so many errors like these to regret if we had all been endowed with the native scholarly caution of the cloakroom attendant in this ingenuous story:

> President Eliot of Harvard once was so delayed in reaching a lecture hall in New Orleans that he did not wait for a check for his hat as he hurried through the anteroom to deliver an address. At the end of the meeting, he was impressed by the unerring promptness with which the old negro in charge of the cloakroom returned his hat. "How did you know this was my hat?" he asked. "I didn't know it was yo' hat, suh, all I knew was that it was the hat you gave me." (*1*)

At present, however, I am primarily concerned, not with erroneous statements, but with matters of form and style and the more or less mechanical aspects of preparing manuscripts.

In a preface, a well-known author who both writes and speaks in a manner to command attention combines a generous acknowledgment of help received with a confession of his need for it:

> The best literary critic I have ever had has been my wife, and anyone who profits by this book is in her debt, and more especially for the absence of numberless words, phrases, sentences, and paragraphs that would have been in it had she not ruthlessly cut out the excess verbiage. (*2*)

Since experienced authors take precautions against having infelicities appear in their books, it seems strange that anyone should be sensitive to criticism of a manuscript and should prefer to wait for reviewers to point out faults in the completed book. Authors ask for technical help from colleagues and other experts in their fields, but they find it hard to get a competent critic of form and style and still harder to discover one who will take the time and the energy to do a thorough job of criticism. I became panic-stricken whenever a referee confidently declared that a manuscript was ready for the printer except for typographic directions.

One of the first articles that came to my editorial desk contained several hanging participles. Since the author was not immediately available, I made my own corrections. When he received his proof, he hurried to a dean and angrily complained that McCartney was trying to teach him English. The dean replied: "McCartney is a new broom, and he is sweeping clean. I, too, use hanging participles." The world would have continued to revolve if the participles had gone uncorrected, but the errors were symptomatic. The author's overconfident English and his methods caused misunderstandings and involved him in rejoinders and polemics.

Authors who practice craftsmanship in conducting research projects have told me, tritely enough, that it is more important to have something to say than to say it well, a remark which implies that craftsmanship in reporting investigations is unessential, even if permissible. This is an aspect of relativity that I find hard to grasp. Good form is expected and needed in every calling, trade, and profession. The ballplayer who acquired a reputation for batting with "one foot in the bucket" could not have been proud of his stance, even if his batting average was high. Nor is "hatchet-and-saw carpenter" complimentary. The saying that "he chops a log in two three times" represents a woodsman's opinion of poor form, and it has a wider application. During my editorship, many persons sent to me copies of obscure and awkward sentences that had been written by experts in their fields. Workmanship does matter.

My freshman rhetoric specified clearness, force, and beauty as the essentials of a good style. In certain kinds of writing, one expects to find literary graces, but if reports of investigations are clear and tidy, they will be forceful and, in the eyes of an editor at least, very beautiful. The comparative rarity of such an accomplishment makes a manuscript outstanding and an editor ecstatic.

Long ago a Roman schoolmaster named Quintilian advised authors to lay aside completed manuscripts long enough for them to seem like the work of others. The advice still holds good, for an occasional author could not tell me the meaning of certain sentences he had written a few months before. One denied the paternity of a "senseless" correction, and I had to show him the directions for it in his own handwriting. He had a distinguished forerunner in Robert Browning. Everyone is familiar with Browning's answer on being asked to explain an obscure passage in *Sordello*: "When I wrote that, God and I knew what it meant, but now God alone knows."

In these days, the young scholar is in a particularly trying position. Owing to the financial pressure upon him as a graduate student, he must win a higher degree in the shortest time possible, and after he secures a position, promotion may depend on his showing further promise as an investigator. Editors experience special pleasure in helping him to get a start, but the repeated submission of complacent, hurriedly written articles throughout a lifetime is unfair. Editors are as hard-pressed as professors, and in the long run authors who have to rework unsatisfactory manu-

scripts for articles and books do not save time. The submission of a "quickie" is really a discourtesy, for it takes time and energy that rightly belong to other authors who are impatiently awaiting attention.

Probably the soaring costs of printing will contribute indirectly to the better preparation of manuscripts, since they are lessening an author's chance to have hasty work accepted. As in newspaperdom, some journals have been forced to cease publication; others have reduced the number of issues in a volume and also the number of pages in an issue. A few now use the offset process and do not submit proof to authors, which means that some blemishes in manuscripts will appear in print and that the proverbially best second thoughts will be lost to the world. Some editors and publishers reject articles that are long or contain matter expensive to set (tables and Greek, for instance) or else accept them only if they are subsidized. And more journals are being compelled to charge authors for corrections. These developments suggest that a larger number of poorly prepared manuscripts are going to continue to be just manuscripts.

To me it seems tragic that authors who are adding to the sum total of knowledge do not take time to discover or make use of the numerous aids available to them. The resources of the Merriam-Webster, for instance, are not generally recognized. Under the word *compound,* it gives the standard rules for hyphens, the discriminating use of which would make an immediate favorable impression on an editor or a critical reader. And the correct plurals of Greek and Latin words that a few biologists never master are crying for attention under the word *plural.* Answers to many other questions, such as the proper capitalization of words used in special senses and the agreement of the verb with *per cent* (now generally written *percent*), are also given.

A scholar who plans to spend a lifetime in research should own, and study, these two invaluable books: *A Manual of Style* (*3*) and *Words into Type* (*4*). The first represents long experience in dealing with the problems of writing and printing. The second presents the results of a thorough reconsideration of the problems of authors and editors. It gives much information not readily available elsewhere and is not dogmatic in its recommendations.

There are countless articles and manuals designed to aid authors, but, like the stream of articles on how to reduce, they get comparatively little result. Authors used to tell me that the aids I recommended to them afforded them no help for their particular ailments, but they proved indispensable to me in doctoring these same ailments and many others. I have listed on pages 133–135 of my book, *Recurrent Maladies in Scholarly Writing* (*5*), some of the more recent publications in the same field as my book. The articles by Bruner, McKerrow, Nicolson, Riker, and Silver are especially useful. The latest indictment of present-day writing is that by Jacques Barzun, "English as She's Not Taught" (*6*).

Authors should learn from the manuals the technical terms used by editors and printers and should spend a few hours in a large printing establishment to familiarize themselves with the various operations of printing and bookmaking. Those who cannot understand why a few corrections ("almost none at all") cost so much should give special attention to the method of making them.

Any author who expects to have extensive use for illustrations should pay an occasional visit to an engraving firm to learn both the potentialities and the limitations of the engraving processes. I repeatedly had to accept line drawings containing faults that a fuller knowledge of engraving requirements would have enabled the authors to avoid. Great care should be taken to guard against oversights in the drafting. It is costly, and sometimes impossible, to correct errors that are unnoticed until after the engravings (cuts) have been made.

It should be superfluous to implore authors once more to prepare articles in the style of the journal to which they intend to submit them, but constant reminders are necessary. If a journal does not have printed or typed directions, careful examination of a few issues will enable an author to determine the main features of its style. There must be close editing of articles in a periodical if the conflicting preferences and usages of the contributors are not to make its issues look unedited. If one may employ a stereotyped exaggeration, "it is impossible to overestimate the importance" of conforming to a journal's style. An editor's style sheet is his Magna Charta, but he often has to defend it against Declarations of Independence.

Observance (not just observation) of a few instructions would facilitate the work of editors, lessen expense, and win the enthusiastic cooperation of the printer's staff, an extremely important consideration that seldom occurs to authors. I know of no editor whose pathetic pleas or arts of persuasion have induced all the contributors to his journal to carry out directions like the following.

1) Write in clear, simple English. Long, involved sentences generally indicate that an author has not thoroughly assimilated his material. Sentences about which one feels uneasy are almost always faulty.

2) Guard against the unwitting and unremitting repetition of words and phrases. *Case, show, found, make,* and *use* are tiresomely overworked by some biologists and geologists. *Case* has occurred four times in 20 words; *show,* 12 times on one page; *found,* 57 times in a rather short article. Longer words like *apparently* (repeated 14 times in a brief paper) and *incidentally* become mannerisms.

3) Try to avoid the monotonous repetition of sentence structure and also a succession of either long or short sentences.

4) Insert all diacritical marks in quotations from foreign languages. Add them immediately after typing the letters that need them. If the keyboard does not have them, write them in with a pen.

5) Write "set as typed" or "OK as typed" above words that might be regarded as mistypings or that might otherwise cause misunderstanding. *Diplomate* has been

changed to *diplomat; empathize* to *emphasize; hemistich* to *hemstitch*; and *precession* (said of equinoxes) to *procession.* Write "OK as set" over such words when correctly set. An intentionally reversed C that was correct on all proof was noticed by a pressman at the last moment and changed to a normal C, much to the author's dismay.

6) Use opaque paper of good quality, not flimsy, transparent grades. Paper is the least expensive thing involved in printing. Leave ample margins. Manuscripts must be typed and be reasonably free of interlineations. Do not submit carbon copies, which are a source of both error and vexation.

7) Discard faded and tattered typewriter ribbons. They are an expensive economy.

8) Double-space everything, *everything.* EVERYTHING—quotations, footnotes, tables, lists in columns, captions, bibliography. The extra space will aid editors, keyboarders, proofreaders, and, eventually, yourself. The editor will give proper directions for reduced type.

9) Group footnotes at the end of the article. A quagmire of text and footnotes is a constant irritation to referees and editors who wish to follow the development of the thought. Copy for reduced type is set up separately, and some firms that are trying to keep costs down use the scissors-and-paste method of assembling it when it is scattered. Notes are distributed in the page makeup unless editors prefer to keep them at the end. Phrase footnotes as carefully as the text. Like shoes, they are noticed.

10) Do not crowd tables. They are expensive to set and difficult to correct. Authors show unpraiseworthy ingenuity in compressing on one page matter that should be double-spaced and spread over two or three pages, but they do not wish to pay for corrections. Cramped tables leave no room for an editor to correct inconsistencies, improve the form, or give directions to the printer. Periods are not used after incomplete sentences in tables. Since tables are set separately, no text should be put on manuscript pages that contain them. Excellent models for the handling of various kinds of tabular material appear in *Words into Type* (*4*).

11) Use mechanical lettering in line drawings and on maps. Lettering devices have greatly improved the appearance of such illustrative material in the last 25 years.

12) Do not be content with makeshift maps. Irrelevant or illegible printed matter on adapted or adopted maps disfigures articles and books and quickly destroys an editor's pride in his work.

13) Draft a friend to study, not just to read, your manuscript.

14) Check the (supposedly) completed article, especially quotations, references, and bibliography. These parts of manuscripts are generally unhappy hunting grounds for editors, since authors do not realize how readily mistakes insinuate themselves into them. In one set of manuscripts the 10-word title of an annual publication that I edited appeared with eight variations. Notes hastily made in libraries, especially those containing quotations and titles in foreign languages, are likely to cause trouble later on for both author and typist. Be very distrustful of bibliographic data taken from secondary sources. Make sure that you have supplied all the data required by your editor and that you have observed his sequence of items. Data for books not immediately available can usually be checked by Library of Congress cards or by reference books familiar to reference librarians.

The work of many persons is involved in the publication of a manuscript, and there are numerous chances for misunderstandings and mistakes. At some time or other, mortifying errors appear in the writings of almost everyone who publishes much. To lessen such risks, the initial stage, the manuscript, should be as nearly perfect as an author can possibly make it. Last-minute corrections sometimes cause exasperating fresh mistakes. Words are tools, and publications are like mechanisms in that they do not fully serve their purpose unless all the "bugs" have been removed from them.

Once in a while an author asserts that he, and he alone, is responsible for the content of his manuscript and the way he expresses himself, but the reputation of a publishing house or of a university press depends on the quality of its output, and it has both the right and the obligation to qualify its acceptance of a manuscript. And what editor is unconcerned about his professional standing? If the Constitution gives an author freedom of speech (and writing), it confers upon an editor the conflicting right to pursue (but not to overtake) happiness.

Even for his own selfish interests, an editor should do his utmost to please authors as well as the publisher, and each author should have the opportunity to pass upon all changes proposed. Editing is a matter of give and take. The problem of reaching an agreement is seldom difficult when an editor and an author can confer personally. It is somewhat harder when corrections have to be made by correspondence, because written criticisms seem harsher, for there is no facial expression or modulation of voice to show the kindliness one feels. No one relishes criticism, but acting the role of professional faultfinder is as distasteful to an editor as it is burdensome. No plaudits greet such acting.

Cordial cooperation elates an editor. On returning a paper to a Japanese author for revision, I expressed regret that I could not find any more ways to heckle him. In his reply he said: "I think you heckled my paper very well."

Bacon tells us that writing maketh an exact man. He does not specify the amount of writing required.

References and Notes

1. From *The Diplomate* **15**, 119 (April 1943).
2. The wife may not have had a chance to prune "excess verbiage."
3. Univ. of Chicago Press, Chicago, 11th ed., 1949.
4. Appleton-Century-Crofts, New York, 1948. The book is based on studies by Marjorie E. Skillin, R. M. Gay, and other authorities.
5. Univ. of Michigan Press, Ann Arbor, 1953.
6. *The Atlantic Monthly* **192**, 25 (Dec. 1953).

For 30 years, Dr. McCartney was editor of scholarly publications at the University of Michigan. This article was invited for Science *because his thoughtful and explicit suggestions for the preparation of manuscripts are applicable in any subject-matter or publishing field. Dr. McCartney's book* Recurrent Maladies in Scholarly Writing *is reviewed on page 544 of this issue.*