English Style in Scientific Papers

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Many scientific papers published in Great Britain are written in a style quite different from that adopted by good English authors. There would be no disadvantage in that, if an improved version of our language had been invented for scientific papers. This, however, is not so. For clarity and directness one must turn to nonscientific authors. One hesitates to direct attention to this subject lest one be accused of setting oneself up as a stylist. There is no such intention here. It is proposed merely to suggest a few ways in which scientific papers could be made simpler, clearer, and more pleasant to read.

To prevent any misunderstanding, it must be remarked at the outset that it is no part of my purpose to try to oppose the use of necessary scientific words. On the contrary, the precise use of certain technical terms, carefully defined and internationally understood, is an obvious necessity. We shall be concerned here with the words that stand between the technical terms.

If one examines all those passages in scientific papers that are least in accord with good English style, one finds that there are three main kinds of error, which may be described briefly as those of grammar, grandiloquence, and German construction.

It would be absurd to treat the subject of grammar at any length here, since good advice on this subject is so readily available. Grammatical errors in scientific papers sometimes make it impossible to be sure what a sentence is intended to mean. In other cases the mistakes are troublesome only because they distract the reader's attention from the subject under discussion. The words ending in *-ing* (especially *using*) are very frequently misused. One repeatedly finds such statements as this: "Examining a capillary under the microscope, after staining with carmine, it resembles a homogeneous hyaline tube." Yet anyone who is intelligent enough to carry out scientific research at a university can easily grasp in 15 minutes everything that it is essential to know about the use of present participles and gerunds.

The menace of grandiloquence seems to derive from the time when doctors used many Latin words; and indeed these errors are much more common in medical and biological than in chemical and physical writings. It is difficult to account for the fact that an Englishman will write *"vide supra"* when he means "see above." It is noticeable that those who use Latin tags most freely do not always know enough of that language to realize that the word *data* is plural.

Long words derived from Greek or Latin roots are often used for expressing very simple ideas. When a man wants to say that something is visible to the naked eye on merely opening the body-cavity, he tries to make it sound grand by saying, "this phenomenon can be macroscopically observed upon laparotomy." Sometimes he uses short words, but chooses an elaborate way of expressing himself. Thus, if he wants to refer to a sheet of metal about 1/100 in. thick, he says that it is "of thickness $\sim 10^{-2}$ in." If his intention is to tell his readers that the longest of the six pairs of chromosomes in a cell is about three times as long as the shortest, he writes, "the maximum size range of the six pairs as represented by the ratio length of chromosomes 1/length of chromosome 6 is about 3/1."

The grandiloquent writer brings in abstract words where none is required. Instead of writing "because the surface of the retina is spherical," he substitutes "because of the sphericity of the retinal surface." Instead of saying that something is near the nucleus, he says that it "occupies a juxta-nuclear position."

Genteelism is allied to grandiloquence. People who think it polite to call a napkin a "serviette" have their counterparts in science, who cannot soil their mouths with paste or mash but must say "Brei" instead. Another example is "sacrificed" for "killed." Allied to genteelism is the deliberate use—not just occasionally, but over and over again—of archaic words instead of their exact equivalents in plain modern English (for example, "save" for "except").

Vogue-words have their place in the vocabulary of the grandiloquent; but what may be called negative vogue-words must also be mentioned here—perfectly good words that for an inexplicable reason must not be used. Why must the word *about* never be used by the grandiloquent? Why must they always say *"circa," "ca.," "c.,"* "approximately," "around," "of the order of," and even "∽"? What is the objection to "separate"? Why must "discrete" invariably be substituted? (A case can be made for the occasional use of "discrete," when special emphasis on complete separation is necessary.) *After* is another negative vogue-word.

Grandiloquence and related foibles, however, are not the worst enemies of good English. A still more serious and more insidious evil exists.

In ordinary speech writing it would never enter anyone's head to say "a tea containing cup"; one would naturally say "a cup containing tea." Yet in scientific journals one will find (for example) "iron containing globules," when what is meant is "globules containing iron." It is questionable whether the writers of such phrases have ever asked themselves why they adopt this construction, which is strange to our language and does nothing to improve it. Why do they say "a hyaluronidase treated area" when they mean "an area treated with hyaluronidase"? Why place a complex adjectival phrase before the noun, and why omit the clarifying preposition? Why say "nonformalin containing fixatives" instead of "fixatives not containing formalin"? Why "eight micra thick sections" when one means "sections 8 μ thick"? Or why does a man who would never dream of saying "the Jones associated people" write of "the nucleolus associated chromatin"?

These, however, are relatively innocuous examples, compared with many that disfigure our scientific journals. "A methylene blue stained preparation of rabbit ear skin" is bad enough, but not quite so bad as *"Dytiscus* red flight muscle sections" or "the use of acidified (by HNO_3) or alkalized (by ammonia) solutions of silver." Even these, however, are not the worst English that it is possible to write, if one is determined to pile up qualifying words other than adjectives in front of the noun they qualify. The limit is perhaps reached by "adenosine triphosphate activated actomyosin contraction." (To spare the reader trouble, I may mention that this means the contraction of actomyosin, activated by adenosine triphosphate.) These are words put together without the slightest attempt at clarity or any consideration

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for the reader. The phrase is worse than merely illiterate: it is rude.

This piling-up before a noun of words that are not adjectives, but are used adjectivally, is rather a new fashion in English scientific writing. It was seldom seen in Britain a quarter of a century ago. There can be scarcely any doubt about its origin. That many American scientists are of German descent is obvious when one looks at lists of authors in journals published in the United States. The process of piling up adjectival phrases is familiar to everyone who knows the German language. It does not make for clarity. It comes naturally to a German to write "die einzigen, durch unmittelbare Beobachtung sicher zu ermittelnden Stellen" or "das von dem Objectiv-system in der der Lichtquelle zugeordneten Ebene entworfene Beugungsspectrum." Unnecessarily difficult though this construction may seem to an Englishman, yet the German language does at least help us, through the inflection of the words, to follow our path through such passages as these. But when this kind of construction is forced artificially on our much less inflected tongue, and the prepositions are omitted, all pretence of clarity is lost.

The German-American style did not originate with men who had set themselves the high ideal of improving our language as a vehicle for scientific ideas. It was, on the contrary, the product of childhood, introduced by people whose parents had spoken in sentences constructed in their native, German way. It is strange indeed that an Englishman or Scot, accustomed since infancy to a simple syntax, with logical order of words, should copy a German-American imitation of English just because he happens to be writing in a scientific journal. Our own language, as written by those who know and love it, can scarcely be surpassed for clarity, directness, and simplicity.

It is noticeable that scientific books published in the United States are often written in a style that is close to ordinary English (though the American people have their own special words, spellings, and phrases). The difference in style between American books on one hand and papers on the other suggests that the publishers correct the style of writing where necessary while the editors of journals do not. It must be remarked that the German influence is altogether lacking from some American scientific papers which are models of lucidity and good style. A paper by Michaelis (*1*) on the reaction of dyes with nucleic acids may be quoted as a particularly fine example.

How can the standard of English in scientific journals be improved? One thinks at once of the obvious works of reference—of Fowler (*2*), Partridge (*3*), and Gowers (*4*). Quiller-Couch's lecture "On jargon" (*5*) is packed with good advice and horrid examples. The teachers of English in our schools could help very much, if they were to study the errors made in scientific papers and base their instruction to science students on their findings. Style, however, is largely dependent on example. Good reading makes good writing. One could almost imagine that some of the contributors to our scientific journals had never read anything but German-American. Yet good examples abound, in books of widely different scope. A trio so diverse as Macaulay, P. G. Wodehouse, and Sir Winston Churchill have this in common, that their English is lucid. There is no dearth of good examples to suit every taste.

A strange fact that gives some basis for optimism is this. When an author has finished the scientific part of his paper, he often addresses a note of general information to the reader. At this point he suddenly discloses for the first time that he can write English, for his ideas are clearly expressed. If one wished to translate what he now says into the style adopted in the rest of the paper, one would have to write something like this: "Some related interest possessing observations by the present writer *et al.* will be the subject of *ca.* $10^{0.3010}$ discrete communications" (*6*). The fact that he does not write like that shows that he need not have done so in the body of the paper.

One last, necessary word. The best English writers occasionally use some of the strange constructions mentioned in this article, often to produce a special effect for a particular occasion. They do so, however, only at long intervals. The greater part of their writing is so smooth and fluent that the reader forgets that he is reading and knows only that he is absorbing ideas.

References and Notes

1. L. Michaelis, *Cold Spring Harb. Symp. Quant. Biol.* 12, 131 (1947).
2. H. W. Fowler, *A Dictionary of Modern English Usage* (Clarendon, Oxford, 1937).
3. E. Partridge, *Usage and Abusage: a Guide to Good English* (Hamilton, London, 1948).
4. E. Gowers, *ABC of Plain Words* (H. M. Stationery Office, London, 1951).
5. A. Quiller-Couch, *On the Art of Writing* (Cambridge Univ. Press, 1925).
6. With the exception of the passage in quotation marks in this paragraph, all the examples given in this article are genuine: none was invented by myself or modified to suit my purpose. I am indebted to A. C. Hardy for a careful criticism of the first draft of this article.

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