

SCIENTIFIC WRITING: A STEP TOWARDS MORE EFFECTIVE COMMUNICATION

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The purpose of scientific writing is to convey information. It must be functional: it is addressed directly to the mind. Consequently, anything that the mind cannot process and decode with ease is to be considered unfunctional. Unfortunately, the more obscure an utterance is, the more prestigious it is thought to be. Many authors seem to forget that obscurity in functional prose defeats its own communicative purpose. For example, in current scientific usage an alternative title to this paper might well have been «Scientific Writing Communication Step» — a title which is as meaningless as it is pretentious.

Even the mother-tongue writer is often guilty of crimes against communication thus providing models that would be best thrown into the nearest waste-paper basket. Reading poorly-written articles quickly leads to the picking up of bad habits which impede communication even among experts. Many of my colleagues in the scientific and technological faculties imagine that their papers would be intelligible to specialists in the same field and are surprised by editorial comments on «a certain lack of clarity observed which we feel may well denote some muddled thinking on the part of the authors».

What is commonly called technical jargon is indispensable to effective communication in that it enables ideas to be conveyed rapidly and precisely to readers in the same specialization. However, the referee's comment from a reputable scientific journal «There appears to be a slight problem of semantics here» is a fairly typical one which

translated into less polite language means «we haven't the slightest idea what you are getting at» where slight and slightest are not semantically equivalent!

Writing is never a painless process — not even for the full-time writer. Yet for the experimental scientist, the putting of pen to paper is usually the culmination of a laborious and painstaking research project, the only tangible proof he has achieved anything worthwhile. It is true that the publish or perish syndrome has caused many unnecessary papers to be written but it is equally true that many good ones have been spoiled by poor presentation.

Inexperienced authors are often unaware of the hard work that goes into the clearer papers in the literature. Universities in both Britain and the United States often have competent bodies of reviewers at their disposal and sometimes even provide regular classes in scientific rhetoric. There is also quite an extensive literature on the presentation of technical material. However, most authors agree that specialized writing courses are only suited to the postgraduate since the undergraduate rarely possesses the conceptual maturity and scientific rigour essential to good writing: his problem is generally not one of style but rather of deciding what weight should be given to the various components of the text.

Since the Italian author is particularly vulnerable in those areas where English usage differs quite considerably from Italian, I shall attempt to point out some of the pitfalls to be avoided. The incorrect use of

noun modifiers is to be the subject of a further paper.

An abuse of abstract nouns

A good English stylist will always prefer verbs to abstract nouns which give rise to a heavy colourless style clogged with unnecessary prepositions and articles. *Remarkable conditions of stability in the coastline are shown* is not nearly so vigorous or precise as *the coastline has proved remarkably stable* (1). On occasion, the indiscriminate use of abstract nouns may even shift emphasis and cloud meaning.

A *Contribution to the Knowledge of Intestinal Transit Times by the Radiopaque Pellet Technique of Investigation* is a modified title from an important geological journal. It must be pointed out that:

- I) A title of this kind is virtually impossible to collocate in an information-retrieval system;
- II) It is not at all clear whether the authors' research field is *intestinal transit times* or the *radiopaque pellet technique*.

As a first step towards more effective communication, I would suggest that *contribution, knowledge* and *investigation* be very firmly crossed out since they have no real communication value. It can be safely assumed that:

- I) The paper would never have been written were it not a *contribution to the knowledge* of the subject;
- II) A paper accepted by a learned journal is the fruit of some kind of *investigation*.

I would have preferred to eliminate *technique* too, but the doctor-colleague who helped modify the title was not in agreement. In revising the last word must obviously belong to the author.

Alternative titles from which the authors might choose are:

- I) *Intestinal Transit Times determined by the Radiopaque Pellet Technique* (2);
- II) *The Radiopaque Pellet Technique in de-*

termining Intestinal Transit Times.

When correcting a first draft of a paper I find it quite useful to cross out all abstract nouns with a lead pencil. A lead pencil (3), eraser, dictionary and thesaurus are all essential to effective revising.

When a sentence is pruned of all unnecessary abstract nouns it becomes infinitely more readable. *The use of S.E.M. in the analysis of surface textures has a wide application for the characterization and quantification of the surface features of detrital quartz particles* was the opening sentence of a paper recently presented at a geology congress. From a purely formal point of view there is absolutely nothing wrong with it. But its readability can be considerably improved by writing *S.E.M. is widely used in surface texture analysis both to characterize and quantify the surface features of detrital quartz particles.*

Remember that in good English rhetoric not only verbs but also adjective and adverbs are to be preferred to the abstract nouns so frequently used. Thus you might cross out *can be deduced from the presence of composite calcite rhombohedra* and write *can be deduced from the composite calcite rhombohedra present*. Instead of saying *has achieved a wide popularity* why not try *has become extremely popular*. As for *taking this fact into consideration it is apparent that* wouldn't it be easier to say *therefore it seems that*? The important *leaving this fact out of consideration* simply becomes *disregarding this fact*.

The list is never-ending. Nevertheless, I have discovered that once colleagues become sensitive to the problem their style improves in leaps and bounds. Clear danger signals to alert the careful reviewer are the colourless

(2) The choice of *determined* rather than *investigated* is due to the consideration that investigations without results are not normally published. However, should the authors feel that *determined* is not particularly apt, Roget's Thesaurus of English Words and Phrases could provide a viable alternative.

(3) Notice the quite deliberate repetition of lead pencil. This is a fairly common attention-getting device in English prose style yet many of the difficulties encountered in deciphering scientific writing would be eliminated if authors did not go to such absurd lengths to avoid quite acceptable repetitions.

(1) *Anatolo-Limestone deposition occurred* is sometimes used instead of *Anatolo-Limestone was deposited* as a stylistic device to vary sentence length.

past participles *occurred, effected, achieved, produced, brought about, carried out, etc.*, which generally mean there is an unnecessary abstract noun lurking somewhere. *Parameter identification was achieved* in clear, simple language is merely the *parameter(s) was (were) identified*.

Pointless passives

Scientific exposition has strict patterns of rhetorical organization which the efficient authors must respect. Frequent use of the passive is one of these. However, many authors, both mother-tongue and otherwise, are under the impression that the passive is the only device for maintaining objectivity in English. Nothing could be farther from the truth.

Though I would be the last to advocate an indiscriminate use of the first persons singular and plural, it must be pointed out that many distinguished journals, including *Science* and the *International Journal of Science* allow their authors to do so without any loss of dignity on the part of either author or journal.

Eliminating an excessive use of the passive leads to a more decisive style. Passive verbs are effective when:

- I) It is essential that the receiver of the action be stressed;
- II) The agent is obvious, unimportant, unknown or unmentioned.

According to Leech and Svartik: *A Communicative Grammar of English* (LONGMAN, 1975), about four out of five English passive clauses have no agent. Therefore, if your prose is peppered with passive sentences containing the word *by*, something is seriously wrong.

The passive has other rhetorical functions: it can be used to provide variety, to substitute for weak imperatives or even to slow down the tempo of an articles which would otherwise be too brisk. However, it must be used as parsimoniously as possible. A pointless use of the passive comes second only to the abuse of abstract nouns in the more confused articles in the literature.

Suppose you were asked in an English lesson:

Whose friends, fellow-Romans and fellow-countrymen were requested to allow that

their ears be borrowed in order that they might be suitably informed that the aforementioned Caesar was to be buried rather than praised by the individual whose name the examinee is required to provide?

It is doubtful that the reader unfamiliar with English literature could ever translate it into: *Who said, «Friends, Romans and countrymen, lend me your ears. I come to bury Caesar, not to praise him».* Yet the Shakespearean version, though containing some of the most exciting lines in English literature, is in the best traditions of functional prose in that it is clear, easily assimilated and not too difficult to remember.

One of the areas where the passive can be misleading — and as a consequence extremely irritating — is in the use of *it is thought that*. It is not always clear whether the author wants to say *I think* or *others may think but I'm going to prove them wrong*. Thus a kind of expectation is built up which may well be disappointed. This is an unforgivable weakness in functional prose: no reader should be expected to perform mental gymnastics in deciphering an academic report. Be firm with yourself. Cross out *it is shown in fig. 5 that* and write *fig. 5 shows that*. Instead of saying *limited silification can be seen within some bioclasts* why not say *some bioclasts show limited silification?* With a little conscious attention it should be very easy to avoid such aberrations as *the recommendation was made by the Earth Science Institute that*.

Get into the habit of looking for the active verb hidden in many passives. *Is composed of* means exactly the same as *consists of* but in the longer sentences in the literature it often gives a very different kind of emphasis. The hidden active verb may sometimes be a little harder to find. *New theoretical results are continuously added by numerical analysis* can become *numerical analysis continues to provide new theoretical results*. Sometimes it might be better to eliminate the verb completely as in *the textural analysis of pyroclastic grains is mostly based on genetic or temporal criteria*: in this particular case it might be preferable to write *the criteria adopted in analysing the texture of the pyroclastic grains are primarily genetic and temporal*.

Useful reading

It is impossible to compile a bibliography directly concerned with typical mistakes made by the Italian author when writing scientific English since no such literature does, in fact, exist. All the examples given in this paper have been taken from primary published or unpublished sources i.e. articles appearing in the Italian Geological Society Bulletin or submitted for correction at the University of Calabria. Brief references to the need for eliminating unnecessary abstract nouns and passive construction are to be found in books concerning the organisation of scientific material.

For the scientist intent on improving the

general quality of his papers the following should prove useful:

TICHY, H.J. (1966) - *Effective Writing for Engineers, Managers and Scientists*. Wiley-Interscience.

CAPP, R.O. (1973) - *The Presentation of Technical Information*.

Should he wish to improve his English, I would suggest:

LEECH and SVARTIK (1975) - *A Communicative Grammar of English*. Longman.

And for an intelligently critical and highly entertaining view of contemporary scientific usage we have:

HUDSON, KENNETH (1978) - *The Jargon of the Professions*.