

Björn Gustavii

How to Write  
and Illustrate a  
Scientific Paper

THIRD EDITION



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Write and  
Illustrate a  
**Scientific Paper**

Björn Gustavii

*Lund University Hospital, Sweden*

*Third Edition*



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# HOW TO WRITE AND ILLUSTRATE A SCIENTIFIC PAPER

## THIRD EDITION

This compact and easy-to-read book contains essential advice on how to take a manuscript from planning right through to publication. It will help both first-time writers and more experienced authors, to present their results more effectively. While retaining the easy-to-read and well-structured approach of previous editions, this essential guide has been expanded to include comprehensive advice on drawing graphs and information about *Open Access* publishing. Illustrations are discussed in detail, with poor examples taken from real papers from top-ranked journals redrawn for comparison. Such before-and-after examples are also provided to demonstrate good and bad writing styles. The reader is offered practical advice – from how to present a paper, where to submit the manuscript, through to responding to reviewers' comments and correcting the proofs – all developed through the author's extensive teaching experience and his many years spent working as a journal editor.

BJÖRN GUSTAVII has been teaching courses in scientific writing for doctoral (Ph.D.) students in medicine for more than 30 years. He brings his personal experience to this book, both from writing more than 100 of his own research papers and from his work as a journal editor.

# Preface to the third edition

Dear Novice Writer,

When I was in your shoes and preparing my first paper, I consulted a book on how to write. I found there a sentence encouraging the reader to stand in boiling water for an hour before doing the analysis:

After standing in boiling water for an hour,  
examine the contents of the flask.

I had a pretty good idea of what was wrong with the sentence but, at the time, I couldn't figure out how to revise it, and the author didn't tell me. Now I can. If, an hour later, you are still alive:

Place the flask in boiling water for an hour,  
then examine its contents.

Therefore, in this book, every unfortunate example is followed by an improved version. Good examples are provided with appropriate bibliographic references. Poor ones, however, are presented with name of authors and titles of papers expunged.

I am delighted to find, since publication of the second edition, that my book is used in more disciplines than medicine and biology. This is understandable because the principle of scientific writing is the same in all disciplines. Many readers have also asked me to write more comprehensively about the graph. This third edition is therefore expanded with several new sections discussing this subject from almost all aspects with examples drawn from various fields outside medicine and biology, such as economics, law, history, political science and family studies.

Finally, don't accept all my suggestions, because there is no ultimate truth regarding how to write a paper – as I mistakenly believed when I was a bit younger.

Good luck, my friend.

Björn Gustavii

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# 1

## Basic rules of writing

Winston Churchill was sitting at his desk, working on his epic about World War II, when his private secretary entered the room. Churchill had reached the Blitz – the German air strikes against London. His staff of researchers had earlier produced a 150-page brief on the raids. The secretary had been asked to cut it down to about two and a half pages and, after having “worked like stink,” he could now proudly hand over the condensed version.

Churchill took out his red pen and started to edit. “All my sloppy sentences were tightened up and all my useless adjectives obliterated,” the secretary tells us in a documentary made about 50 years later (Bennet 1992). In the midst of it all, Churchill said gently, “I hope you don’t mind me doing this?” The secretary answered, “Thank you, Sir – you are giving me a free lesson in writing plain English.”

### **Brevity**

We should emulate Churchill by excluding every nonessential word. Professional writers do it that way. Brevity is an elementary rule of all writing, not only to save valuable publication space, but also because verbose writing obscures meaning and wastes the

reader's time and patience. And that is also the essence of the next basic rule.

## **Logic and clarity**

To convey information is above all a matter of logic and clarity. What you want to say should be so arranged that the reader can follow your argumentation step by step. Moreover, your sentences should be so clear and easily understood “that the reader forgets that he is reading and knows only that he is absorbing ideas” (Baker 1955).

Now to the importance of making the manuscript physically attractive. Here is an illustrative example.

## **Physically attractive**

In 1987, when most of us still used a mechanical typewriter, Paul Fogelberg, editor of a Finnish scientific journal, was one of the teachers at a course on scientific writing. Late one evening, he told us, he was perusing a manuscript in which only half of the letter “a” was legible. Page after page, that half-letter pursued him until eventually he began to feel vaguely that this must be something directed at him personally.

I didn't see Fogelberg again until 12 years later at a meeting of editors. I mentioned the damaged typeface, without really expecting that he would remember it. But he replied instantly, “It wasn't damaged. Much worse – it wasn't cleaned.”

But errors can occur of other kinds, does it really matter? Yes, because editors know from experience that there is a close relationship between a poorly prepared manuscript and poor science. Therefore make sure your manuscript looks carefully prepared; it may influence editors and referees in your favor.

# 2

## Comments on scientific language

A MEDLINE<sup>1</sup> search showed that no fewer than 90 percent of papers listed in *Index Medicus* in 1999 were written in English, compared with 53 percent in 1966 (the year MEDLINE started). The saying “Publish in English or perish” must therefore be taken seriously. Regrettably, this means that many authors are obliged to write in a language other than their native tongue – with all that this can entail. Here I will share with you an episode from my own experience as a non-native writer of English.

### English as a foreign language

My first paper published in English was initially written in Swedish and then translated into English by a professional translator. “Brilliant,” I thought when I saw the translated version. But when my supervisor read it, he shook his head and said, “Try to write directly in English!” “Gosh,” I said to myself, thinking of my poor grades in English at school, “I’ll never, ever be able to do that.”

But I decided to try and consulted the textbooks, which advised me to read writers of fine English, such as Gibbon and his *Decline*

<sup>1</sup> MEDLINE, created by the United States National Library of Medicine; includes over 21 million references to journal articles in life sciences, with a concentration on biomedicine; coverage dating back to 1946.



*and Fall of the Roman Empire*. I bought the book (running to 3616 pages in three volumes!) but could find neither the time nor the interest to read it.

Instead, I subscribed to the American weekly magazines *Newsweek* and *Time*. As they often cover the same topics, the reader is given the opportunity to learn twice, in different words, about the same issues. I have found this very instructive.

I have also found another manner that has served me well. When I have to tackle a new topic, I read leading English-language publications on the subject, underline useful phrases and words, and then create a list of the terms for each section (Introduction, Methods, etc.). I noticed, however, that I seldom had to consult my list. During the process of making the list, the brain seemed to have retained what I had read and written.

I have hardly ever submitted a manuscript in English without asking a linguist to look at it. Ideally, those correcting English ought to be persons who: (1) not only are native speakers of English but also live in your country and speak its language; (2) return to their native country at least once a year to refresh their English; and (3) have a knowledge of scientific writing. Correctors fulfilling these criteria are a rare species. Many authors therefore have to rely on English-speaking persons who, for instance, happen to be working in their department or laboratory. That may not be so bad, after all, because these persons are no doubt acquainted with your field of research. But you must be aware that native-English-speaking researchers do not necessarily write good English – just as not all Swedish researchers are good at Swedish.

I return to my early paper, translated from Swedish into English. On rereading it 30 years later, I found to my embarrassment that it didn't express exactly what I meant to say, though I found the style elegant. However, even clumsy writing would have been better than this, had it conveyed the information accurately.

Why are papers in biomedicine often almost unintelligible? Maybe an editorial in *The Lancet* (1995) had the answer when it