SILVIA M. ROGERS

MASTERING SCIENTIFIC AND MEDICAL WRITING

A SELF-HELP GUIDE

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Springer

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Library of Congress Control Number: 2006926502
ISBN 10 3-540-34507-8 Springer Berlin Heidelberg New York
ISBN 13 978-3-540-34507-7 Springer Berlin Heidelberg New York

Editor: Dr. Ute Heilmann, Heidelberg
Deskeditor: Meike Stoeck, Heidelberg
Coverdesign: Frido Steinen-Broo, eStudio Calamar, Spain
Production & Typesetting: LE-TeX Jelonek, Schmidt & Vöckler GbR, Leipzig
Printed on acid-freepaper 11742203 21/3100/YL – 5 4 3 2 1 0

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ABOUT THE AUTHOR

Silvia M. Rogers, BSc, PhD, is the founder and owner of MEDIWRITE, a successful small company in Basel, Switzerland. She trained at the University of Liverpool, UK, in the Department of Pharmacology and Therapeutics headed by Professor Sir Alasdair Breckenridge. Before forming MEDIWRITE in 1994, she gained extensive experience in key areas of pharmaceutical research, including project management in a major pharmaceutical company. She is an active member of the American Medical Writers Association (AMWA) and the European Medical Writers Association (EMWA). She lectures on scientific writing at the University of Basel and has provided extensive training in various aspects of medical and scientific writing and presentation. She has written numerous expert reports, regulatory documents, scientific publications, and study reports for clients.

ACKNOWLEDGMENTS

First and foremost, my thanks go to my workshop participants and University students of the past 10 years, without whom this book would not have been written. Their active participation, questioning, and challenging of issues during workshops encouraged me to put into print the most important aspects of scientific writing.

I am most grateful to my colleagues whose input greatly helped to shape the contents of this book. A very special "thank you" goes to my favorite linguist, Seraina Clark-Wüthrich, who contributed substantially to the groundwork and structuring of this book and never tired of commenting on the various stages of the manuscript.

Finally, I gratefully acknowledge the astuteness and competence of my proofreaders, namely Kathleen A. Bucher, BioConsult GmbH, and Thomas C. Brown, and the patience of my husband and son.

PREFACE

> "If any man wish to write in a clear style,
> let him first be clear in his thoughts."
> *Johann Wolfgang von Goethe*

You may ask why anyone would want to write yet another book about scientific writing. There are many books on the subject, some more useful than others, and the abundance of literature on this topic may confuse rather than guide.

I felt that this book was necessary for several reasons. During the past years, I have learnt much about the needs of scientific communicators, both through my personal experience as a pharmacologist and, later, through teaching scientific writing at universities, pharmaceutical companies, and other institutions. In today's busy world, guidance on scientific writing must be focused and to the point. Our constraints no longer permit the time-consuming search for the "correct" word or formulation. Moreover, the speed by which we produce a manuscript has become increasingly important, be it in academia or the pharmaceutical industry. Scientists often find it difficult to accept that their professional success essentially depends on their skill and efficiency to communicate their research results. Without any doubt, the rapid exchange of pertinent information is critical to scientific advancement and should therefore be regarded with due respect.

A second, perhaps even more important reason for writing this book is my personal concern for everyone challenged to write high-quality texts in a language that is not his or her native tongue. As a Swiss-Anglo hybrid (as I like to call myself), I sympathize with their special circumstances and wish to make a contribution to overcoming linguistic dilemmas.

In short, this book deals with clear, unambiguous language within and across the biological and medical sciences. Unlike textbooks on English grammar that analyze and prescribe the use of the language in its various forms, this book tells you how to apply your existing language skills to scientific

communication. If you do not only want to write but want to write *well*, this book is for you.

I have used a number of symbols to draw your attention to definitions or rules, examples of the principles stated, or exercises on the subject. This table shows the symbols:

SYMBOL	... AND WHAT IT MEANS
	Definition or rule
	Example
	Exercise

1 | INTRODUCTION

> "Those who cannot remember the past
> are condemned to repeat it."
> *George Santayana*

The main purpose of scientific writing is to record data. Without a written record of our findings, there is no proof that we have done the research, and precious information may be lost. Many an experiment may have to be repeated, simply because there is no record of the data. Needless to say, this negligence adversely impacts on the efficiency of sharing scientific knowledge.

One of the main challenges of scientific writing is to pack vast and complex information into clear and well-structured texts. It is a skill that requires not only knowledge of the scientific field but also practice in writing. Uncertainties about the required style and format of scientific papers may delay publication of important findings.

We must bear in mind that scientific writing differs substantially from literary writing. While literary writing is an art based on principles of personal style, fiction, and originality, *good* scientific writing is a craft that builds on clear communication of scientifically researched facts.

The beauty of medical and scientific writing is its ability to express the most complicated concepts in clear words and to point out the beauty of science without distracting decoration. Although we would all agree that the beauty of science is in the science itself, not in the language used to describe it, we have to accept that a confusing account of our findings will not do justice to the science that lies behind it.

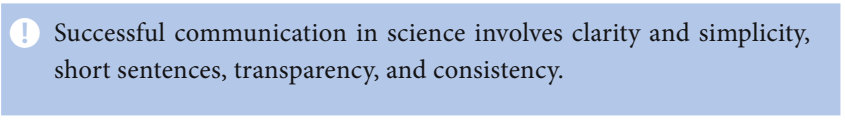
What can we as writers do to ensure that our scientific message reaches the intended target population?

Good scientific writing is:

- **understandable:** Readers should *read* our paper in full, rather than discarding it after a few sentences because the text makes no sense to them. We should also bear in mind that while the international scientific language

is English, the native tongues of readers (other scientists, regulators, etc.) may be a language other than English.

- **transparent:** The written report is often the only way for readers to access the research done. Thus, our scientific paper is the only "window" through which readers can view our "laboratory."
- **clear:** Some scientists seem to want to keep their acquired knowledge to themselves rather than share it with the scientific community or their peers. They may choose to write in a vague, complicated, and unstructured manner, using ample ornamentation that distracts the reader. However, good scientific writing should inform rather than confuse the readers.
- **credible:** As scientists, we have to be credible to gain our readers' respect. For instance, if we apply for a research grant, our written proposal must be convincing, both in terms of the concepts and the language used to describe them. Similarly, a paper written in an accurate, compelling, and logical style conveys to the readers that the research described was also done accordingly. The way we express ourselves portrays the way we think.
- **efficient:** By improving our scientific writing skills, we essentially gain time. Poorly written papers may be delayed or even rejected although the science behind them may be of considerable interest. A reputation of being a good and reliable scientific writer will open doors to more publishing and positive feedback.
- **simple:** Text devoid of unnecessary decorative words is more readily understood than complicated, ornamental expositions.



2 | GOOD VERSUS POOR SCIENTIFIC WRITING: AN ORIENTATION

"Everything that can be thought at all
can be thought clearly.
Everything that can be said
can be said clearly."
Ludwig Wittgenstein

2.1 | WHAT IS "GOOD" SCIENTIFIC WRITING?

When we declare that a certain text is better than another, we rely on a scale of values, with "good" at one end, and "poor" at the other.

But who sets the standards for "good" and "poor" scientific writing? Who is the ultimate judge? Who censors the quality of our scientific texts? While general opinion of what is "correct" may be divided, there are certain bodies or sources that we usually accept as authorities. These include:

- dictionaries
- grammarians, linguists, editors, teachers
- scientific community
- set traditions and accepted trends.

Nevertheless, even experts may disagree among themselves. I have seen groups of learned scientists brooding over a paper, in an attempt to decide whether the paper is well written or not. Opinions often clash, and precious time may be lost because of unnecessary arguments over issues of style that may not affect the clarity of the message.

The ultimate judgment of the quality of our scientific writing efforts lies with the readers themselves. If the learned reader follows our train of thought and understands our message, then the writing has fulfilled its primary purpose.

Nonetheless, we have conventions to follow, guidelines to adhere to, and trends to observe. The changes and trends we have seen over the years could

almost be called evolutionary. Many of the rules for good scientific writing valid 10 or 20 years ago have been modified, undone, or even reversed during subsequent years (for example, see 5.2, Active versus Passive Voice).

When evaluating the "power" of a scientific manuscript – your own or some other author's – you may find it helpful to consult the document standards listed below:

Table 2.1 Document Standards

STANDARD	DESCRIPTION
Purpose	*The purpose of the manuscript must be obvious and unambiguous.*
Conformity	*Text has to conform to given formats, e.g., for health authorities, marketing, journals, books etc.*
Accuracy	*The wording must be grammatically correct, concise, accurate, and precise.*
Consistency	*Terminology should be consistent and appropriate.*
Logic and flow	*The manuscript should be a "story" with a clear message based on a logical train of thought.*
Context	*The "story" must be presented in the context of established literature or other reported work, and must be congruent with accepted institutional or regulatory values.*
Structure	*A logical structure (i.e., headings and subheadings, paragraphs, figures, and tables) should be chosen.*
Data presentation	*High-quality data should be presented clearly, using tables and figures as appropriate.*

2.2 | THE PLAIN LANGUAGE MOVEMENT

Joanne Locke, Senior Policy Advisor and Plain Language Coordinator at the U.S. Food and Drug Administration (FDA), reviewed an initiative termed "The Plain Language Movement" (American Medical Writers Association [AMWA] Journal, Vol. 18, [1], 2003). The movement dates back to the 1970s when the U.S. federal government began encouraging its regulation writers to be less bureaucratic.