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978-1-107-67074-7 - How to Write and Publish a Scientific Paper: Seventh Edition

Robert A. Day and Barbara Gastel

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How to Write and Publish a Scientific Paper

Seventh Edition

An essential guide for succeeding in today's competitive environment, this book provides beginning scientists and experienced researchers with practical advice on writing about their work and getting published.

This new, updated edition discusses the latest print and internet resources. Preparing, submitting, and publishing scientific papers is now largely electronic, and the book has been revised to reflect this. New material features more information on including supplementary material online, using reference management software, and preparing tables and figures; expanded sections on structuring a discussion section and the strengths and limitations of the research; and additional material on international aspects of scientific writing.

The book guides readers through the processes involved in writing and publishing for scientific journals, from choosing a suitable journal to presenting results and citing references. It covers ethical issues in scientific publishing; explains rights and permissions; and discusses writing grant proposals, giving presentations, and writing for general audiences.

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Preface

Criticism and testing are of the essence of our work. This means that science is a fundamentally social activity, which implies that it depends on good communication. In the practice of science we are aware of this, and that is why it is right for our journals to insist on clarity and intelligibility.

—Hermann Bondi

Good scientific writing is not a matter of life and death; it is much more serious than that.

The goal of scientific research is publication. Scientists, starting as graduate students or even earlier, are measured primarily not by their dexterity in laboratory manipulations, not by their innate knowledge of either broad or narrow scientific subjects, and certainly not by their wit or charm; they are measured and become known (or remain unknown) by their publications.

A scientific experiment, no matter how spectacular the results, is not completed until the results are published. In fact, the cornerstone of the philosophy of science is based on the fundamental assumption that original research *must* be published; only thus can new scientific knowledge be authenticated and then added to the existing database that we call scientific knowledge.

It is not necessary for the plumber to write about pipes, nor is it necessary for the lawyer to write about cases (except *brief* writing), but the research scientist, perhaps uniquely among the trades and professions, must provide a document showing what he or she did, why it was done, how it was done, and what was learned from it. The key word is *reproducibility*. That is what makes science and scientific writing unique.

Thus, the scientist must not only “do” science but must “write” science. Bad writing can and often does prevent or delay the publication of good science.

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Unfortunately, the education of scientists is often so overwhelmingly committed to the technical aspects of science that the communication arts are neglected or ignored. In short, many good scientists are poor writers. Certainly, many scientists do not like to write. As Charles Darwin said, “a naturalist’s life would be a happy one if he had only to observe and never to write” (quoted by Trelease, 1958).

Most of today’s scientists did not have a chance to take a formal course in scientific writing. As graduate students, they learned to imitate the style and approach of their professors and previous authors. Some scientists became good writers anyway. Many, however, learned only to imitate the writing of the authors before them—with all its defects—thus establishing a system of error in perpetuity.

The main purpose of this book is to help scientists and students of the sciences in all disciplines to prepare manuscripts that will have a high probability of being accepted for publication and of being completely understood when they are published. Because the requirements of journals vary widely from discipline to discipline, and even within the same discipline, it is not possible to offer recommendations that are universally acceptable. In this book, we present certain basic principles that are accepted in most disciplines.

Let us tell you a bit about the history of this book. The development of *How to Write and Publish a Scientific Paper* began many years ago, when one of us (Robert A. Day) taught a graduate seminar in scientific writing at the Institute of Microbiology at Rutgers University. It quickly became clear that graduate students in the sciences both wanted and needed *practical* information about writing. If a lecture was about the pros and cons of split infinitives, the students became somnolent; if it addressed how to organize data into a table, they were wide awake. Therefore, a straightforward “how to” approach was used for an article (Day 1975) based on the lecture notes. The article turned out to be surprisingly popular, and that led to the First Edition of this book.

And the First Edition led naturally to the Second Edition and then to succeeding editions. Because this book is now being used in teaching programs in many colleges and universities, it seems especially desirable to keep it up to date. We thank those readers who kindly commented on previous editions, and we invite suggestions that may improve future editions. Please send suggestions and comments to Barbara Gastel at b-gastel@tamu.edu.

This edition is the second for which Barbara Gastel joins Robert A. Day. Gastel remains grateful to Day for asking her to collaborate. We are delighted that our first edition together was translated into at least five languages, and we hope the current edition will be widely translated too.

In keeping with its title, this book has always focused primarily on writing and publishing scientific papers. It also has long provided broader advice on scientific communication. Beginning with the first edition, it has contained

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chapters to help readers write review papers, conference reports, and theses. Over time, chapters were added on other topics, such as how to present a paper orally and how to prepare a poster presentation. Additions to the previous edition included chapters on approaching a writing project, preparing a grant proposal, writing about science in English as a foreign language, communicating science to the public, and providing peer review.

The current edition maintains this scope but has been substantially updated and otherwise revised. Preparing, submitting, and publishing scientific papers have now become very largely electronic, and the book has been revised accordingly. We also have made some revisions to serve better the international readers of this book. In addition, we have updated the book to reflect the latest print and Internet resources available, and we have added an appendix listing websites especially useful in scientific communication. Cartoons have long been a popular feature of the book; in this edition, there are additional cartoons by Sidney Harris and for the first time there are cartoons by Jorge Cham, of PHD Comics.

This book remains a “how-to book” or “cookbook,” focusing mainly on points of practical importance. As in past editions, the book also contains some other items, such as cartoons and examples of humorous errors, intended to lighten the reading. Readers wishing to explore topics further are encouraged to consult works noted in the text or cited as references and to look at websites mentioned in this book.

Good scientific writing is indeed crucial. We hope this book will demystify writing and publishing a scientific paper and help you communicate about your work effectively, efficiently, and even enjoyably. Your success will be our greatest reward.

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A Word to International Readers

For researchers throughout the world, communicating in English in standard Western formats has increasingly become the norm for sharing information widely. Thus, over the years *How to Write and Publish a Scientific Paper* has had many readers for whom English is not a native language. We hope the current edition will serve an even wider readership.

Aware of the diversity of our readers, we have tried especially hard in the current edition to present the main content in language easily understood by non-native speakers of English. One issue we faced, however, was whether to retain the jokes that enlivened the book for many readers but sometimes confused readers from linguistic or cultural backgrounds other than our own. Because these jokes have been a distinctive feature of the book and one of its appeals, we have retained most of them in those chapters updated from early editions. However, because humor often does not translate well cross-culturally, we have limited its use in the more recently added chapters.

If, as an international reader, you occasionally encounter a silly-seeming story or comment in this book (for example, the story at the end of the chapter on how to prepare the Abstract), do not worry that something is wrong or that you have missed an important point. Rather, realize that you are seeing some examples of American humor.

We welcome readers from throughout the world and hope they will find our book helpful in communicating science internationally. Suggestions for making the book more useful are appreciated at any time.

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Over the years and over the editions, many colleagues and others have contributed directly or indirectly to this book. Those we have worked with in scientific publishing and academia have shared information and ideas. So have fellow members of the Council of Science Editors and the Society for Scholarly Publishing. Students and other users of the book have made suggestions. Many colleagues have read and commented on manuscripts for previous editions. Wura Aribisala, George Hale, Arkady Mak, Roberto Tuda Rivas, and Nancy Day Sakaduski read the previous edition or the manuscript for the current one and offered thoughtful suggestions. Editors and production staff brought the work to publication. We thank all these people. We also thank our families for their support, encouragement, and counsel.

In addition, we thank the international and other researchers who—at workshops, via Internet, and in other settings—have asked questions that prompted additions to this book. It is to our students and colleagues from around the world that we dedicate the current edition.