

1: Scientific writing

What is written without effort is in general read without pleasure.

Samuel Johnson (1709–1784)

The objectives of this chapter are to understand:

- the importance of publishing research results
- how to organise your time to write a paper
- the components of writing that make up a paper

Reasons to publish

Scientists communicate the fruits of their labour mostly in writing, and mostly in scientific journals. Conferences and other forms of verbal communication, including the evening news, play an important role but the written word reaches the widest audience and constitutes the archival message.

Kenneth Rothman (www¹)

It is important to publish research results for many reasons. In the most basic sense, it is unethical to enrol participants in a research study with their understanding that you will answer an important research question and then fail to report the study results in a timely manner. It is also unethical to accept a grant from a funding body and then fail to publish the results of the research that you conducted using the funds. Failure to publish reflects badly on your reputation as a scientist and is likely to have a significant influence on your future career and your ability to attract further funding. On the other hand, success in publishing contributes to rewards such as job promotion and professional recognition.

A scientific article that is published in a well-respected, peer-reviewed journal is an important goal for any researcher and remains one of the ultimate markers of research success. For this reason, it is important to write your paper well so that it has clear messages, is readily accepted for publication, and is something that you can always be proud of.

A well-written paper is one that is easy to read, tells an interesting story, has the information under the correct headings, and is visually appealing. It is a sad fact of life that few researchers or clinicians read a journal article from beginning to end. Most readers want to scan your paper quickly and find the relevant information where they expect it to be. If you want the information in your paper to be read and to be used, you must be certain that you have presented it in an organised and accessible format.

In the current academic climate, publications are imperative for career advancement and for the economic survival of research departments. In many institutions, the number of successful publications is used as a measure of research productivity. In addition, other attributes of publications, such as the number of collaborators, the number of resulting citations, and the impact factor of the journal, are often considered. As such, publications are a fundamental marker of accountability. Box 1.1 summarises some of the important reasons for publishing your work.

Box 1.1 Reasons to publish your research results

It is unethical to conduct a study and not report the findings
You have some results that are worth reporting
You want to progress scientific thought or improve health outcomes
You want to give credibility to your research team
You want your work to reach a broad audience
Your track record will improve
You will add credibility to your reputation
You will improve your chance of promotion
You are more likely to obtain research grants

Motives to publish vary widely. Some researchers may have a driving force to contribute to advancements in scientific knowledge and improvements in patient care, or may simply

love their work and want to share it with others. Other researchers may work in a unit that has a “publish or perish” imperative so that journal articles are essential for professional survival. Whatever your motive, you will need something important to say if you want your results to be published. A report of the sixtieth case of a rare condition is unlikely to be published even if it makes fascinating reading. Similarly, reports of uncontrolled clinical studies, inadequately evaluated interventions, or laboratory data that do not address the underlying mechanisms of a disease are unlikely to be published in a good journal. To improve your chances of being published, your study must have a rigorous design, your results must answer an important question, and your paper must be written well. A well-designed and well-reported study is always a good candidate for being accepted by a respected journal.

Rewards for being a good writer

Generally keep it short and to the point. It is not a novel you are writing. If you get stuck, take a break. Leave the draft by your bedside. Sometimes a phrase just comes to you and it is a shame to lose it.

Anthony David¹

Having good scientific writing skills can not only bring career success but also brings many other personal rewards as shown in Box 1.2. These rewards are often fundamental for job promotion in a world in which grant applications, published journal articles, and oral presentations are used as formal indicators of research performance. These indicators may also be critical at a departmental level where the number of successful grant applications, postgraduate students, and publications are used as formal markers of team productivity.

Box 1.2 Reasons to be a good writer

Writing time is more productive and less frustrating
Peers will take you more seriously
Your research is more likely to lead to publications
Your grant applications are more likely to be funded
Your expertise will help you to become a good reviewer or editor

A well-written paper is one that is very publishable, adds credibility to your reputation, and is much more likely to be read in its entirety and thus taken seriously by the scientific community. Bad science is not usually publishable (although it happens) but good science reported well is more highly respected than good science reported badly. Of course, mind-blowing discoveries will always be respected no matter how they are written. Few of us are lucky enough to have such discoveries to report but even exciting new findings are better appreciated if they are written elegantly. The famous phrase “It has not escaped our notice that ...” from Watson and Crick when they reported their discovery of the double helix² is a prime example. The sentence that they wrote was *It has not escaped our notice that the specific pairing we have postulated immediately suggests a possible copying mechanism for the genetic material*. This was a modest way to declare that they had discovered a structure for DNA that was both biologically feasible and would facilitate the replication of genetic material. The article was a model in concise writing in that it occupied only one page of *Nature*.

Most researchers will never be able to emulate the importance of the findings of Watson and Crick, although we may strive to emulate their concise writing style.

There is no doubt that good writing skills will bring you a more rewarding research career because fewer keyboard hours will need to be spent on each published paper. Long hours spent at the computer rearranging pages of print are not the best way to achieving a happy and healthy life. By reducing the time it takes from first draft to final product, good writing skills are a passport to both academic success and personal fulfilment.

In being a good writer, you will automatically become a good reviewer. By definition, reviewers are experts in their field who are asked to assess the scientific validity of submitted papers or grant applications. Being an experienced reviewer also leads to invitations to participate in advisory bodies that make decisions about the scientific merit of proposed studies, that judge posters or presentations at scientific meetings, or that have the responsibility of marking a postgraduate thesis. All of these positions are rewarding recognition that you have that certain talent that has an important currency in the scientific community.

Making it happen

“Do it every day for a while” my father kept saying. “Do it as you would do scales on the piano. Do it by pre-arrangement with yourself. Do it as a debt of honour. And make a commitment to finishing things.”

Anne Lamott³

Scientific documents cannot happen unless they are given priority in life. To achieve this, it is important to develop good time management skills that enable you to distinguish between the urgent and the important issues in your working day.⁴ Before you begin writing, you need to get on top of the urgent and important tasks for the day. It’s a matter of addressing the crises, completing the deadlines, and getting the pressing matters off your desk and out of your mind. It is also a good idea to be aware of, and minimise, the urgent but unimportant matters such as unnecessary mail and meetings that tend to waste the day away. If you let the unimportant matters fill up your day, you will never find enough time to write.

Committed researchers need the skills to programme dedicated writing time into their working week. In an excellent book on time management, the focus on important tasks is described as spending time on “quadrant II activity”.⁴ An adaptation of the quadrants in which you can spend time is shown in Table 1.1. By definition, quadrant II activities are not urgent but they have to be acted upon because they are important to career success. By minimising the amount of time you spend on the urgent and important activities in quadrant I and by avoiding non-important activities in quadrants III and IV, you can spend more time on prime writing and thereby become more productive. It is prudent to remember that there is no such thing as having no time to write. We all have 24 hours each day and it is up to each of us to decide how we allocate this time.

If you are serious about wanting to publish your work, you need to schedule adequate time for the activity of writing in the “important but non-urgent” quadrant. There is good evidence that this works. By rising at 5am every morning and writing for several hours every day, Anthony Trollope completed more than fifty books and became one of England’s

Table 1.1 Time management⁴.

	Urgent	Not urgent
Important	Quadrant I Crises, deadlines, patient care, teaching, some meetings, preparation	Quadrant II Research, writing, reading, professional development, physical health, and family
Not important	Quadrant III Some phone calls, emails, mail, meetings, and popular activities, for example morning and afternoon teas	Quadrant IV Junk mail, some phone calls and emails, time wasters, and escape activities, for example internet browsing, playing computer games, reading magazines, watching TV

most renowned 19th century novelists. Although many of us would argue that Jane Austen or Thomas Hardy wrote much more interesting novels, no one can doubt that Trollope's commitment to his writing and his time management skills led to greater productivity.

When you are researching, scheduling time for quadrant II activities ensures that you can give priority to designing the study, collecting the data, analysing the results, and writing the papers. Many researchers have no problem finding time to conduct the study but have difficulty in finding time for writing. The good news is that constructing a paper will be more rewarding if you develop good writing skills and you will come to enjoy using your "quadrant II" activity time more effectively.

Once your data analyses are underway and the aims of the paper are decided, you should begin writing in earnest. Ideally, you will have presented your results at departmental meetings, at local research meetings, or even at a national or international conference. This will have helped you to refine your ideas about how to interpret your data. You may also have a feel for the topics that need to be addressed in the discussion. With all this behind you and with good

writing skills, putting the paper together should be a piece of cake.

Achieving creativity

You should allow yourself to get into a writing mood. Finish the background reading, the review of the literature, and the work to date. You know it inside out. Relax. Take deep breaths. Just let it flow. Many people find music a help but choose carefully ... Wear comfortable clothes; a sweater and jeans are fine.

Anthony David¹

To write effectively, you need to find a physical space where you can both work and think. This space is probably not going to be the same office from which you conduct consultations, direct staff, take phone calls and answer endless emails and voicemails in the course of everyday business. For most people, a clear, thinking space needs to be a place where interruptions are minimal and so, by necessity, will be away from your daily work environment.

Your thinking space needs to be a place where you can feel comfortable and relaxed, where you don't have to power dress if you don't want to, and where you can play thinking music if you find that helps you to write.¹ "Mufti" days were invented so that people could relax in the freedom of not having to wear their working uniform. If it helps, award yourself a mufti day and choose some appropriate music. For some people baroque or flute music is ideal, for others Mark Knoffler or Red Hot Chilli Peppers does the job perfectly. Italian opera is definitely too dramatic and blues or jazz may leave you focused on some of the sadder events in life. You need music that will relax but not distract you – the choice is entirely up to you.

To write effectively, you must also tune in to your creative day and your creative hour. For some people, Thursdays, Fridays, and Saturdays are best because most of the urgent processes of the week are over. Others may find the pending excitement of the weekend distracting and thus prefer to begin writing refreshed on a Monday. Some people who are

morning writers can happily word process their ideas whilst ignoring everything around them that will wait until later in the day when their creativity has burnt out. Others may be afternoon writers who need to deal with the quadrant I matters first and work up to writing when the urgent list is clear. It doesn't matter when or where you write, as long as you choose your best opportunities and organise yourself accordingly.

Whatever your creativity pattern, it is important to visit your writing as often as possible, every day if you can. Writing new text may take a significant amount of work but reading and reviewing written text to polish it up can often fit into short time blocks and can be done anywhere. When you have spare moments to edit your writing, you need to inspect your sentences and your paragraphs for needless words, silly flaws, and clumsy transitions. Writing is a process of constant repair but if you are passionate about your research this will not be arduous. It will be exciting to see your paper taking shape, becoming simple and clear, and acquiring impact. Refining your writing so that it takes on more form and character and becomes easy to read is well worthwhile. This is one of the hallmarks of scientific writing.

Thought, structure, and style

And whenever I see a first novel dedicated to a wife (or a husband), I smile and think "There's someone who knows". Writing is a lonely job. Having someone who believes in you makes a lot of difference. They don't have to make speeches. Just believing is enough.

Stephen King⁵

Scientific writing is a well-defined technique rather than a creative art. The three basic aspects to effective scientific writing are thought, structure, and style.

- *Thought* is a matter of having some worthwhile results and ideas to publish. You need some new results to publish and you need to be able to interpret them correctly.

- *Structure* is simply a matter of getting the right things in the right place.
- *Style* is a matter of choosing the fewest and most appropriate words and using the rules of good grammar.

When you ask for feedback on the thoughts and structure of your paper, you are asking for a macro-review of the basic content. On the other hand, if you ask for feedback on the style you are asking for a micro-review of the words, grammar, and order. In a sense, there is little point in a reviewer providing feedback on the style until the thoughts and structure are in place. To gain the most from peer review, you should be clear about the type of feedback you would appreciate most and whether your paper is sufficiently advanced to ask for micro-feedback.

Constructing a well-organised paper is the first step to improving accessibility and readability. A nicely structured paper with no worthwhile results, or worthwhile results in a badly structured paper, are unlikely to be published. Moreover, papers that are written in a poor style in terms of expression and grammar are unlikely to appeal to editors, reviewers, or fellow scientists, and are also unlikely to be published in a good journal. In Chapters 2 and 3, we explain how to present your thoughts and academic ideas using the correct structure, and in Chapters 8–11 we give examples of how to write in a clear style. The web site resources that may be of help are listed at the end of each chapter and are referenced as (www¹) throughout. All website addresses were current when this book went to press.

The thrill of acceptance

Seeing your name in print is such an amazing concept: you get so much attention without having to actually show up somewhere... There are many obvious advantages to this. You don't have to dress up, for instance, and you can't hear them boo you straight away.

Anne Lamott³

There are relatively few high points in research but most of us recognise one when we see one. Some high points that spring to mind are the acceptance of a paper by a journal, conducting a data analysis that confirms your hypothesis, and news that a grant application has been successful. Certainly, having a paper accepted is one of the most far-reaching successes. The corollary is that having a paper rejected is a depressing and crushing event that is worth trying to avoid.

After a paper has been sent to a journal, there is always a time of apprehension while you wait for a reply. This can take from weeks if you are lucky, to months if you are not. For some journals, electronic submission and electronic communication with external reviewers has expedited the review process. Whether electronic or manual, the first letter that returns from the journal generally confirms the arrival of your paper on the editorial desk. The next letter is much more fundamental in that it is likely to signal acceptance or rejection. This letter always brings a frisson of terror and expectation as you open it, and then either elation or devastation when you read it. It's never any different. All papers are important to their authors and there is no middle ground between potential acceptance and outright rejection. If you ever have difficulty in writing, it may be encouraging to think of the thrill of the moment when your paper is accepted for publication. It is a heady moment, one of the true highs in research and an event that is worth striving towards.

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