CHAPTER 5
HOW TO WRITE A SCIENTIFIC PAPER FOR A PEER-REVIEWED JOURNAL

PHIL LANGE

INTRODUCTION

> *All of the chapters in this book speak to our aspirations to contribute to addiction science and to have a role in the scientific life of this field. In large part, this role comes through being published in peer-reviewed journals.*
>
> Susan Savva (2007)

A career in addiction science is largely built on the (perceived) quality of publications that a researcher (or a team of researchers) offers his or her colleagues. If these publications are numerous and of high quality, they lead to research funding and employment. To gauge the contribution of a researcher to addiction science, fellow researchers may consciously or unconsciously compute the number of worthwhile publications that a colleague has produced in relation to the number of years she has published. The greater speed of release for journal articles when compared with books, typically months versus years, means that those who wish to influence their field of study need to publish in peer-reviewed journals in order to communicate quickly their research results.

This chapter offers the novice author a step-by-step guide to prepare a paper for publication. Annotated bibliographies and references listed at the end suggest further readings worth consulting about specific problems. The chapter begins with the proviso that good paper written by a graduate student or a junior investigator may be highly praised by faculty and colleagues and yet fall short of being publishable. Indeed, editors regularly receive poor papers that are accompanied by a letter from a graduate student saying that his or her professor recommended submission. Yet praise from a professor or colleagues does not set aside the need for the novice author to scrutinize every aspect of her text to see that it conforms with the demands of a scientific article.

This chapter offers suggestions on how to use the style guide for the journal of your choice (for which there is additional information in Chapter 2), explains how to use a publication manual, and offers step-by-step guidance on the writing process itself. It also offers advice about working with colleagues, writing strategies, and how to maximize the worth of your paper for your selected journal. Some of the steps mentioned here are described in more detail, and sometimes with a valuable differing viewpoint, in Chapter 9.

This chapter is written for the reader who has completed several years of post-graduate education and has completed a research project that she wants to publish in a peer-reviewed journal, but is unsure of some of the basic steps in preparing the paper for submission.

This chapter is also appropriate for the reader who is already proficient in another field of science but wants to add papers in addiction science to her list of publications. For this scientist we advise caution: terms with everyday meanings may have different meanings for addiction scientists. For example, the word *recovery* connotes in the popular press and in everyday life that someone has undergone a course of clinical treatment, or perhaps an affiliation with Alcoholics Anonymous. But in addiction science, *recovery* means achieving precise behavioural goals or a given score on a measure and by a given point in time. There are enough such special concepts built around everyday language that the converting scientist is advised to gather a group of colleagues to advise her research from the beginning.

We assume here that the reader is already competent in all areas of writing a scientific paper. This chapter aims to fine tune competence in writing, not to teach the basics of science. At the other end of the continuum, a researcher whose papers are already often accepted in the journals of her choice will likely find little of interest here. Authors from developing or non-English speaking countries may wish first to read Chapter 3, which explores some of the special challenges encountered by researchers from developing and/or non-English speaking countries.

A successful publishing career means writing for a highly specific scientific audience and it takes most authors years to discover how to do this in a way that results in a high percentage of accepted papers. An early decision is whether to work alone or with colleagues. To acquire these skills you can work alone, in isolation from colleagues, and hope to learn from rejection letters and from harsh peer reviews. Or, you can build an informal team of fellow scientists who are both critical and supportive and who will read and comment on your papers. This is often a quicker, more efficient, and more stimulating path. If you are new to a centre or department and you want to sort out quickly who will be supportive of your aims versus who may be less than helpful (i.e., those who have reputations for being always harshly critical, for promising and then failing to read and critique papers), ask people you trust this question: "If you were writing on my topic of _____ whom would you trust to critique in a helpful way?" A novice author can learn much from established authors by passing them drafts for their assessment and their recommendations for getting published.

Writing a scientific paper for a peer-reviewed journal can be as creative an act as writing the great Suomi novel, but less constrained than composing iambic pentameters. Some people write beautifully and effortlessly while others feel like they are sweating out each word. But over time authors with both writing styles make successful contributions to science.

This chapter presents one way to write such a paper; it is not the only way, of course, but it does offer the advantage of a clear step-by-step method that helps you to plan ahead. If you follow these steps, you will finish with a paper worth submitting to the journal of your choice. At the end of this chapter we also present an annotated bibliography describing other approaches to preparing scientific papers for peer review.

Being methodical, let's start with a checklist and begin with all of these items handy within arm's reach.

CHECK THE STYLE GUIDE FOR YOUR JOURNAL OF CHOICE

Each journal has its own specific style configuration and to be accepted by a journal you must write to *its* requirements, not those of another style format and not to your own personal preferences. To do this, have all information on all of the parameters required for the one journal that you have (initially) chosen (see Chapter 2 for more information). Many journals offer a one-page style guide. But even the minimal style guides for undergraduate papers typically run to many pages, so clearly a lot will have been left out of a one-page summary. Contemplate that the *Publication Manual of the American Psychological Association* (APA, 2002, pp. 3-76) has seventy-three pages on style alone. Much can be said for simply sitting down and reading these seventy-three pages for a quick and complete overview of essential topics that are left out of most brief style guides. Read these APA paragraphs and you will emerge an enlightened initiate knowing what topics to be sensitive to even if you must use a different style guide than this manual.

Alongside the official parameters given by your journal of choice, you may also have calculated or astutely teased out other style parameters that will affect your paper, such as the preferred length of the paper and its abstract; gender-neutral or other styles of preferred language; the maximum number, length, and style of footnotes or endnotes; and the maximum size of tables.

A brief warning about tables and figures: journals may not specify the size limits on tables and figures yet these have a huge effect on what information you can include in them and how you organize your writing. Beginning researchers have a tendency to send wider, longer, and less interesting tables than seasoned researchers. To create tables that will fit the page in those cases where the journal gives no guidance, (a) estimate the typeface in the table when compared to the textual typeface, and (b) build model "trial" tables (one row, the number of columns needed, longest possible data lines per table cell) that fit the page like tables in the journal and within the journal's required page margins. Then build your tables. This alone may save you from immediate rejection or the work of rewriting the text and reorganizing the table. If you have tables that require more than one page, check the journal to see if it publishes tables of that size or check with the editor. Editors have horror stories of good papers that arrive with huge tables that could never fit on a page. (The tricks authors use to accomplish this include tiny typefaces, margins of less than a centimetre, formatting rows that run off of the edge of the page, and carrying on for several pages with landscape orientation with a journal that does not accept that format. Don't consider any of these as you will only infuriate the editor.)

Check the style guide for requirements governing the presentation of figures and make sure that they fit within the journal's page parameters and technical requirements. There is a danger in looking to old copies of a journal to assess table and figure design. Find a current copy for up-to-date formatting. If you cannot get a current copy on-line or at a university library, write to the editor explaining the situation and the editor --- surely pleased at your concern --- will likely send a sample copy. Figures are often easily sized by click-and-drag formatting to fit a given space within the correct margins.

Box 5.1 THE IMPORTANCE OF JOURNAL GUIDELINES

Editors agree that far too many authors ignore the crucial step of reading and following the journal's submission guidelines. Ask yourself, "Am I 100% confident that I've followed every one of even the smallest details in the journal's guidelines?" If your silent answer to yourself is "Hmmm, certainly yes, probably 90% or 95%," then your next step is to accept that this is not good enough: go back and fix those few items so that they are correct.

Read and follow the journal's instructions.

DO A THOROUGH LITERATURE REVIEW

The literature review is a crucial portion of your paper. Many beginning researchers have problems with the scope and structure of the literature review. By studying examples of good literature reviews you can improve your understanding of current standards. Wikipedia offers an introduction to the basic points of literature reviews at http://en.wikipedia.org/wiki/Literature_review. Kathy Teghtsoonian offers a useful didactic example explaining alternatives in a review of the literature on smoking at http://web.uvic.ca/spp/documents/litreview.pdf. An example of a thorough literature review paper that serves as a model for shorter reviews within a paper, with exemplary background, definitions of terms and variables, treatment conditions, and results, is this paper on quasi-compulsory drug treatment in Germany by Wolfgang Heckmann, Viktoria Kerschl, and Elfriede Steffan published by the European Institute of Social Sciences at the University of Kent: http://tiny.cc/KNeKC. (But avoid the one-sentence paragraphs frequent in this otherwise fine review; most editors and reviewers hate them and complain about even one or two.) Cochrane Group reviews also deserve your attention. Not only may a review from the Cochrane Group spark improvements in your research, but reading a collection of reviews can also help you to develop a model for your work. See http://www.health.qld.gov.au/phs/documents/cphun/32103.pdf.

Peer reviewers will be much more familiar with the literature than you are, and so your literature review needs to read as informed and critical, not naïve and accepting of all that is cited.

One way to improve your literature review is with a step-by-step approach. Have these materials handy:

- All of the relevant literature needed to establish the theory and/or hypothesis that you will examine. (It will help to outline your paper and to see what background or literature reviews you need for each section.)

- All relevant literature for each of the measures that you have used (the initial paper describing each measure, crucial papers describing challenges, alterations, refinements, including statistics on validity, reliability, and all other relevant attributes).

- All of the data needed for your Methods, Procedures, and Results sections. A good way to assess if you need more literature for a given section is to ask yourself, "If I were challenged to support why I chose this [measure, method, statistic], what literature supports my choice?"

If you are writing about qualitative research (QR) for a journal that publishes little of your specialty, be sure to have the latest work on rigor in QR and link it solidly to your work, for the probability is high for a rough ride from reviewers who know little about QR and may be more biased than they realize. ("I have seen a few good qualitative papers; but very few," they tell me.) Also, please read Chapter 6, which explains how to write about qualitative research.

WRITING STEP #1

Contact your chosen journal with a draft title and abstract, ask if your paper is of interest and relevant to the journal's mandate, and ask any awkward questions (…flexibility on paper length? average time for peer review time?). Now is the time to learn if your paper is acceptable to this journal, not after you have spent days writing a paper to a specific format when that journal is unlikely to accept it. If the answer is favourable, you are ready to start writing. If the response is unfavourable, look for another journal. Alternatively, you might consider asking knowledgeable colleagues what journal(s) they feel are the best choice(s) for your paper.

WRITING STEP #2

Now settle down to write for colleagues and your posterity your unique contribution to addiction science. Here are a few specific guidelines for each section of your paper:

Title: You should know the overall writing style of your chosen journal well enough to know intuitively what is a suitable title for your paper. If in doubt, (a) read the 'Table of contents' of several issues to get a feel for their style of titles, and (b) make up a couple of possible titles and ask for reactions from colleagues who know this journal well.

Mistakes to avoid: Trendy and cute titles soon look trivial and dated. An editor may allow such a title (especially if rushed), but years from now it will look embarrassing in your CV as reviewers read it to evaluate if you deserve research funding.

Box 5.2 THE IMPORTANCE OF ORIGINALITY

A frequent mistake made by beginning researchers is to not make clear to the editor and reader what is the *original* contribution of a paper. It is easy to forget that scientific journals exist mainly to publish original knowledge. Describe the originality of your research analyses in your initial letter to the editor to see if she is interested in your paper, so that if it later appears on her desk she will remember it for the innovative understanding that it offers. For the reader's benefit, your original contribution(s) should be clear from the Title (if possible), mentioned in the Abstract, and described in the Introduction and in the Discussion (and/or Conclusion).

Abstract: The abstract summarizes how you carried out your research and what you learned. Even if you don't use the structured abstract (Objective, Methods (or) Design, Sample, Results, and Conclusion) it can serve as a guide to a succinct unstructured abstract. As an example of structured abstracts, the *British Medical Journal* requires structured abstracts within a sound framework: objectives, design, setting, participants, interventions, main outcome measures, results, and conclusions.

Mistakes to avoid: Don't go beyond what is established in your paper: offer no non-significant results, no speculation. Don't use telegraphic style (i.e., omitting articles and other parts of speech to achieve brevity) unless allowed by the journal. Don't go over the abstract size limit set by the journal.

Introduction: A good introduction tells the reader why the paper is important in terms of the problems to be investigated, the context for the research question, what place this research question has in understanding addictions, and what is original about the endeavour.

Mistakes to avoid: Don't simply describe the substance or behaviour under study. Authors who see this as sufficient too often feel that the problem substance or behaviour itself implies what research is needed. This is almost never true. At no point should the volume of loosely related information make the reader feel lost and wonder, "Why is all of this information here?" Avoid archaic arguments that have been resolved or that are not pertinent to your paper, even though you may have spent months researching these and you have a fascinating solution to the debate. Avoid formulaic first lines; a sentence like "Access to legalized gambling has increased greatly in the last two decades" begins at least one third of papers on gambling. An occupational hazard of editing is to receive by the dozens papers with opening lines such as "Alcoholism (or drug dependence, or tobacco use) is a significant public health problem." The editor's eyes glaze.

Literature review: The literature section of a dissertation is an entire chapter. For a paper it should briefly summarize only the most important references that lead directly to understanding the importance of this paper in addressing crucial questions in the addictions and this specific research process. For detailed guidance on which papers to cite, check in this volume Chapter 7, "Use and Abuse of Citations." When completed, compare your draft with the literature reviews in your journal of choice.

Mistakes to avoid: If several authors have been involved in writing the literature review then it is likely too long and detailed, for each author adds what she knows are essential works.

Method: After a reader has gone through this section she should know the research methods in such detail that she could replicate the study in full with another sample. One way to check the completeness of this section is to have a colleague read it and ask her to verify if she could carry out this research project wholly from the Methods section. If there are previously released papers using the same methods (whether yours or others, and especially if described in more detail) then you should cite these. This may allow you to shorten the Method section.

Mistakes to avoid: If some aspect of your methods is suboptimal it is better to mention it here with the comment "see the Limitations section" and then be straightforward in the limitations section. Don't try to hide or disguise poor methods; reviewers will pounce on them. If your research involves randomized control trials, editors may refer you to the Consort Statement promoting high standards and uniform methods: http://www.consort-statement.org/

Results: Here you describe the outcome(s) from your research. Double-check that each novel finding to be discussed has already been reported here.

Mistakes to avoid: This section especially lends itself either to over-writing (excessive detail beyond what is needed for analysis, excessive weight given to non-significant results) or to under-writing (cursory attention to important aspects and variables). A mistake to avoid here is opening the Results section with a description of the sample and the analyses that are more relevant to the Methods, such as the validity of your measures. Start your results section with the main findings. Beginning researchers often take up too much of their paper with non-significant results; be ready to drop a result which colleagues or reviewers suggest is unimportant, even though it seems like a wondrous and magical thing to you.

Discussion and or Conclusion(s): Describe how your specific results fit into the world of addiction science. You may address issues raised in the literature review, you may address policy issues, or you may raise new questions that are either unaddressed or rarely addressed by others.

Mistakes to avoid: A little speculation is allowed, but limit it and ask your supportive colleagues what they think. Restrict your discussion of your future research plans to a line or two. Some authors like to end with the trite conclusion "More research is

needed." It always is. If you wish to write in this vein, be as specific and creative as possible in tracing what original work needs to be done and what interesting hypotheses it will test.

Limitations: Describe in brief detail the suboptimal aspects of your research. This new trend has come with demand for more transparency in research publishing. Junior authors are often afraid that being open about the limitations of their research will create prejudice against a paper. Nonsense. Senior researchers (i.e., editors and reviewers) will see flaws in your work that you will likely not see. Reviewers and the editor ask only that you acknowledge limitations. To do so is not a sign of weakness in you or your approach, but much to the contrary; it shows that you are on top of what are best practices, and you are a person who sees the need for better methods (as opposed to those who stumble along pleased with their inadequate work). In short, simple, and unapologetic language, describe the shortcomings that kept your work from being optimal. Some journals allow an author to note limitations throughout the text (i.e., not as a subheading towards the end of the paper); you may wish to check to see if your journal of choice allows or prefers this alternative.

Mistakes to avoid: Don't be ingratiating (i.e., don't apologize, don't promise to avoid these mistakes in the future, don't offer excuses), for this creates the impression of servility. You are not grovelling; you are only signalling to your peers that you know what is better practice in research.

References: It is easy to forget that the function of references is to allow any reader to retrace the evidence that you cite. Electronic sources that close down and unavailable conference papers and reports threaten this openness. You should be totally fluent in the minute details of proper reference style for your chosen journal. Too many errors tell the editor that an author has been careless and this suggests carelessness perhaps elsewhere, too.

Mistakes to avoid: Verify if translation of foreign language titles is required. If it is, translate foreign language titles even in the first version you send to the editor.

Appendices: If your journal of choice seems not to have published appendices, then check with the editor to see if they are allowed. Appendices represent an excellent solution to the problem of presenting background information (legislation, policy statements, questionnaires and measures, speeches, protocols) that is too long for the body of the paper. They are also easy for a reader to skip: a blessing. In e-publishing, some journals allow appendix materials such as video files, sound, and URL access that are difficult or impossible to include in print journals, as well as more traditional materials. NOTE: Such data may not have peer review status if not evaluated by the reviewers.

Mistakes to avoid: Omit appendices that you feel are relevant to the paper but that colleagues feel are not linked.

WRITING STEP #3

You have written this first version early enough to allow you to circulate it to several colleagues whom you can trust to read and offer prompt and fair critiques. Once you have their feedback, consider if their assessments warrant rewriting before submitting it to your chosen journal.

WRITING STEP #4

Submit your paper to the editor. Bon voyage on this first step in becoming a contributor to the world of addiction science!

WRITING STEP #5

Your paper has been accepted for review (whether minimal or extensive) and has come back with the reviewers' and the editor's comments. This would be a good time to consult Chapter 9, which describes referees' reports and how to respond to them. If you decide the referees' criticisms are too severe for you to answer, then write the editor and tell her so along with your precise reasons for not revising your paper. This accomplishes several good things to your benefit: (a) it labels you as someone who takes editing a journal seriously, who knows her goals, and doesn't let work slide, (b) it signals to the editor how serious the criticisms were and may lead her to discuss options with you, and (c) she will remember you as someone who didn't leave her hanging and wondering if that paper was ever coming back.

If you decide to revise your paper you have several choices. Authors should not see themselves as helpless in front of their reviewers. To reassure them of their rights, at our journal we offer this paste-in text sent to even experienced researchers so that they all know what their rights are in the face of reviewers' comments:

> As we tell all authors, a reviewer's comments are not orders that have to be carried out. To the contrary, for each point that a reviewer has made an author has these three options:
> i) discuss/debate/refute a reviewer's comment(s), or
> ii) rewrite the text in response to a comment(s), or
> iii) a combination of these so that an author both discusses/debates/refutes a reviewer's comment(s) and rewrites to accommodate some comments by a reviewer. In many of the articles that you see in print, there are several points that are just as the author intended because she debated and defended her approach as written. As editor, I sometimes very much give the author the benefit of the doubt.

The last point in answering the reviewers' comments is practical, but often overlooked. Be crystal clear in accounting for how you responded to each point made by each reviewer. An efficient way to do this is to follow each reviewer's comment with an explanation of how you respond and to key this up in a contrasting and easily read colour (dark blue or dark green are good choices).

If your paper is rejected then carefully read the critiques and see if you feel that submitting it to another journal seems a wise step. If so, be sure to format it thoroughly to that journal's style and revise it in response to the reviewers' criticisms.

WRITING STEP #6

Once your paper is accepted you may have little more involvement until the editor or publisher sends you the proofs to check. When the proofs arrive and you see how the nuances of your careful writing style have been altered, it is easy to feel lonely and unappreciated. But please respect that copyeditors know well what is more readable and credible to the target audience. If you have a hard time deciding on whether to accept a change or not, a criterion is to ask yourself "Has my meaning been respected or has it been changed?" If it has been respected, then let it be as edited and trust the copyeditor. In a year when you read your paper once again you will usually see the wisdom of the copyeditor's changes.

CONCLUSION

When your first addiction paper is published you will have made a contribution to the addiction sciences and to the public arena where the dialectics between what is, what could be, and what will be, are in struggle. A proverb: some Inuit say that a man can only be as good a hunter as his wife's sewing will let him be. In the addiction sciences the effectiveness of our research, treatment methods, policies, and advocacy can only be as good as the literature that we publish.

The author is grateful for invaluable contributions from Susan Savva, Ian Stolerman, Kerstin Stenius, Sheila Lacroix, Thomas Babor, Gerhard Bühringer, and Jean O'Reilly.

FURTHER READING

Below I present a number of annotated bibliographies. If they don't contain a work specific to your needs or the books are unavailable, try searching your local university or professional library using search terms such as *scientific writing* or *publication manual* in the 'title' or 'subject' window.

Yet another technique is to find the library classification codes at your nearest university for books on writing psychology and biomedical science (for example, at the University of Toronto they are mostly among the Dewey decimal codes T11 and R119) and then to peruse the shelves in those sections looking for books that didn't come up in your title or subject search. Some would call this a strategy of desperation, but half of the books in the annotated bibliographies below were found this way.

Some advice about choosing works (books, papers, Web sites) to help you to be a better scientific author: many of the books that I found are written in what I call an exhortatory style in which the title offers to improve your skills and then the text consists in telling you to do something, but without effective teaching. Some, in effect, exhorted "Write clearer!" but had nothing to help the reader select unclear writing and step-by-step guides

for how to make it clearly written. Choose works that you can see will be of help to you and whose approach makes sense, not those that promise but don't resonate with your understanding.

To find relevant Web sites try searching on an exact phrase (perhaps *scientific writing*) and then in the 'all of the words' window (where articles and conjunctions are not needed) narrow the search with specifics, perhaps, *avoiding passive* or using *semi-colons* or any writing area in which you would like to improve.

ANNOTATED BIBLIOGRAPHY OF SCIENTIFIC WRITING: BASIC PROBLEMS OF WRITING STYLE AND MOTIVATION

Strunk, W., & White, E.B. (2000). *The elements of style*. (4th ed.) London: Allyn and Bacon. Still one of the best and shortest writing guides, easily read and absorbed. Those learning English find its clarity and brevity helpful.

Rogers, S.M. (2007). *Mastering scientific and medical writing: A self-help guide*. N.Y.: Springer. A compact guide with exercises as solved problems; good for overcoming specific writing handicaps.

Alley, M. (1996). *The craft of scientific writing*. (3rd ed.) N.Y.: Springer.
Lengthy chapters on building competence and curing shortcomings.

Silvia, P.J. (2007). *How to write a lot: A practical guide to productive academic writing*. Washington, DC: American Psychological Association. This breezy guide is especially good for authors who realize that their writing style needs improvement, or who have been told that a component of their paper (abstract, introduction, method, results, analysis, discussion, conclusion) misses the point of what it should communicate. Journal papers have 23 pages of coverage in this book.

ANNOTATED BIBLIOGRAPHY OF SCIENTIFIC WRITING: FOCUSING ON STANDARDS FOR SCIENTIFIC PAPERS AND SPECIFIC SCIENTIFIC AREAS

Huth, E.J. (1990). *How to write and publish papers in the medical sciences*. (2nd ed.) London: Williams and Wilkins. This compact work offers practical advice on how to make decisions about what to write and what to leave out for both novice and experienced researchers. A highly readable source.

Gustavii, B. (2003). *How to write and illustrate a scientific paper*. Cambridge University, UK: The Cambridge Press. This work is oriented to the biological and medical sciences. It is the clearest and most succinct work that I found among all such works at our local university. A marvel of clarity and utility. It is also full of relevant URLs for up-to-date information.

Miller, J.E. (2005). *The Chicago guide to writing about multi-variate analysis*. Chicago: University of Chicago Press. This work shows how specific are the aids available to scientific authors. The book is a mini-course in writing about numbers, i.e., statistical analysis.

REFERENCES

American Psychological Association (APA). (2002). *Publication manual of the American Psychological Association*. 5th ed. Washington, DC: APA.

British Medical Journal. (n.d.) Resources for authors: Research. Accessed June 19, 2007 http://resources.bmj.com/bmj/authors/types-of-article/research

Savva, S. (2007, July 25). Personal communication.

WEB RESOURCES

Several Web-based approaches to writing are available:

Two guides that address basic problems include http://academic.bowdoin.edu/courses/f02/bio105/dissemination/ScientificPaperBasic.pdf
and http://classweb.gmu.edu/biologyresources/writingguide/ScientificPaper.htm

An advanced, comprehensive guide:
http://www.aspsilverbackwebsites.co.uk/RobertWest/resources/checklistarticle.pdf