

How to Write a Scientific Paper

(with apologies to E. Robert Schulman)

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Abstract

We (meaning I) present a method (meaning my method which cannot be copied) of writing scientific papers. The abstract is often the only thing that is read so it is important to cram in as much as possible. Your paper might be read if you include something controversial in the abstract. What follows is a good example of this. The importance of this paper is timely since my employer (University, College, course requirements etc.) is exerting considerable pressure on me to publish more papers and since this is not a peer-reviewed paper we (meaning I) can write whatever we (meaning I) like and still receive considerable credit for doing so because our University will receive a modicum of funding for this publication. Furthermore, if we (meaning I) do not publish enough papers we (meaning I) will probably not have our contracts renewed and may never get offered another academic appointment. These observations are consistent with the theory that you really do have to publish or perish.

Why write a scientific paper?

Why write a scientific paper? This is the first and most important question that must be answered before pen reaches paper, or fingers hit the keyboard. Good science involves discovering something new about the universe, but this is not really the reason for writing scientific papers. What is really necessary is meeting the requirements of the College or, particularly for those in academia, securing a grant. More often than not, it is the number of scientific papers that you have published that is the most important benchmark assessed by granting bodies. Without publications you wont get your Fellowship application approved. Without publications scientists cannot get money from the government or universities to do research. In order to obtain a big grant, the application must state that the science will discover something incredibly fundamental but the granting body must also be told that you are the only person capable of doing this particular research. Therefore you should cite yourself both early and often when writing such applications. You should also feel free to cite your other papers as well (Raidal & Cross 1994; Raidal et al 1998), even if they are irrelevant (Ladyman et al 1998), but so long as you are on the author list (Morgan et al 2000). Once you get the grant, your university, company, or government agency will immediately take 30 to 70% of it so that they can heat the building, pay for Internet connections, and meet the salaries of their chief executives (Schulman 1998). After the grant has been fiscally fiddled you will quickly discover that your project is not as simple as you thought it would be and you can't actually solve the problem. However, and this is very important, you must publish anyway.

Getting started

Read (meaning copy) what other authors have written, but don't plagiarise without correctly citing the original paper (Schulman 1998).

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The Introduction

The introduction should briefly summarise the state of knowledge concerning the particular topic of your paper. It should not be a comprehensive literature review. Editors hate long introductions that cite all of the known literature on your topic. Be critical and highlight the gap that your paper fills. Never include uncited references in the bibliography and always check that all of your citations are listed.

The real purpose of introductions, of course, is to cite your own work (Raidal & Cross 1994; Raidal et al 1998), the work of your supervisor or mentor, the work of your potential examiners (Pass & Perry 1984), the work of your spouse (Raidal et al 1997), the work of friends (McElnea & Cross 1999), or even the work of someone you have never met, as long as your name happens to appear somewhere on the paper (Morgan et al 2000). It is important to refer to recent publications especially if they represent a new area of your interest (Jaensch et al 2000) and at least one incredibly ancient publication that no one has access to (Elley 1913). By doing this you give the impression of having read widely. Note that these citations should not be limited to refereed journal articles, but should also include conference proceedings, casual conversations, emails, internet sites (<http://www.improbable.com>) and other published or unpublished work providing it supports your argument.

At the end of the introduction you must summarise the main purpose of the paper and why it is important. For example: *The purpose of this paper is to justify my trip to College Science week at the Gold Coast thereby securing a contribution to the costs of doing so by my employer.*

Authorship

Most institutions have very strict guidelines stating the justifications of authorship. Most people ignore these. Include anyone who might be of some influence as coauthors (Morgan et al 2000). You should include your postgraduate students, as we (I) have done, because they need publications more than you do. It is even better if you include coauthors without their knowledge as I (sorry we) have done. After the first author most people (especially those with surnames ending in S, T and W) insist that the coauthors be listed in alphabetical order. For some strange reason it is neat to be listed either first (Raidal et al 1998) or last (Ladyman et al 1998). It is especially impressive to have a very influential surname, preferably a full professor, at the end of the authorlist because this person may be a mate of the editor or the reviewers (Morgan et al 2000). This means that your paper will certainly be published.

Rules about writing

The most important rule to remember is that the word "which" should almost never be used. You should use the find and replace function in your word processor to replace all instances of "which" with "that" even if the sentence sounds silly. Be sure to spend at least 50% of your time changing the format or the typesetting of the paper so that all the figures and tables look nice.

Schulman 1998

Be succinct and always use past tense.

The introduction, materials and methods (or case report) and results must be written in past tense because they refer to literature or events that occurred before you sat down to write. This is the most common grammatical error. For example in the introduction you might say that a paper by Fred (1956) *claimed* (rather than *claims*) that ostriches *were* (instead of *are*) poikilothermic because their rectal temperatures *fluctuated* through the day but Nirk (1966)

proved otherwise by experimentation. Or when writing the material and methods or results for case reports: radiographs *revealed* osteochondrosis or necropsy examination *demonstrated* severe proliferative proventriculitis.

Materials and method?

You must report how your observations were made. Describe how you made them in detail. Use subheadings to categorise the laboratory or diagnostic tests or other procedures. Refer to papers if you did something according to previously published work. This saves space and the editor will be happy. It also means that someone else trying to replicate your work has to find the primary paper. For this reason it is a good idea to use methods published in the Estonian Veterinary Journal. Don't draw attention to the deficiencies of how you made your observations because all papers have serious flaws, otherwise there would be no reason to write future papers. Besides, the reviewers will highlight the flaws if they do their job properly. If you are lucky they will miss the clangers.

Results

This section should be succinct and must be factual and descriptive. Just report the results, even if you cannot explain them. Don't lie, you can do this in the discussion. Others should be able to reproduce your results but if they can then you obviously gave too much detail in the materials and method.

Whenever possible include Figures and Tables but these should be tacked onto the end of your manuscript. Don't try and insert them in the text but do spend considerable time getting them perfect because the reviewers like pictures. It proves that you actually made the observations. Editors on the other hand hate figures and tables and will do everything in their power to delete them from the manuscript because they cost too much to typeset and print. Never discuss the findings or cite other publications in the results section, leave this for the discussion.

Discussion

The results of this paper indicate that it really is not too difficult to write scientific publications or (and this is a commonly used reason for publication) as far as we are aware this is the first report of tetratrachomoniasis in black breasted quail in Australia. Nevertheless, in the authors (meaning my) opinion the first paragraph of the discussion should succinctly explain the results or state how novell your observations are. You should state the obvious here because no one will read the materials and methods or results unless you do so. Your audience will read the abstract first and then maybe the introduction and then probably the discussion. They do this to see if it is really worth while sifting through the materials and methods or results.

Writing a good discussion is the most difficult part especially if you really don't know why your paper should be published (see above). You will be even more hesitant if your results or observations are incomplete or difficult to explain. Don't worry about this, send the paper anyway, plenty of other authors have done the same before you. However, you really should at least make a mediocre effort to downplay the negative results or unexplainable observations. By being critical of your own results allows you to get stuck into others, that is the real purpose of the discussion.

It is not enough to simply list the literature by stating that one paper found this and another that. That gets very boring. You need to be critical but always use qualifiers like "probably", "may be" and "most likely". For example, Bishop & Dogrell (1994) argued something controversial in their paper but their results were total crap because their methods were *probably* flawed and they *may have* misinterpreted their results, besides their research had nothing to do with the topic anyway. Our results, however, are fantastic and

clearly support our hypothesis over all others. Having said this it is worth finishing off the discussion with a one-liner along the thread of “these results are interesting but they open up a can of worms and further research is required into the topic (meaning we clearly need more money to pursue our research)”.

Sending the paper to the journal

By now you should realise that it would have been a good idea to talk to the editor before you sat down at the beginning. Also, now is a good time to study the “Instructions for Authors” page which can be found hidden away in the the March issue or password protected on the web site of the journal you have selected to submit your paper to. The March issue is always the one that was borrowed by a colleague or that has fallen down behind your filing cabinet. Have your colleague or one of the coauthors proof-read your paper to detect misused jargon, spelling and grammatical errors. Make sure all of your tenses is/are/were correct. Editors and reviewers hate such errors and pedantically spend hours searching medical dictionaries for the true spelling or meaning of words such as contagious or oncomiracidium. Forget about the science - your paper will be accepted or rejected on this alone.

Most journals require that you sign a declaration stating that your paper is your own work and has not been submitted for publication anywhere else. No one ever does this. Nevertheless, it is polite to at least include a cover letter that blandly states something along the lines of: Please find enclosed our (meaning my) paper titled “My opinion on how veterinarians should write scientific papers for publication in scientific journals” that we (meaning I) wish to submit for publication in *Your Amazing Journal*. Don’t worry about the title of the manuscript but go with a long tedious one. The editor will almost always summarise the title to something digestible like “*How to write a scientific paper*”.

The journal editor will pick the referee most likely to be offended by your paper, because then at least the referee will read it and get a report back within the lifetime of the editor. Now you will appreciate how helpful it is to include highly controversial comments in the discussion. Don’t be upset by their negative comments. It is helpful if they personally attack you because you can use this in your defense. As mentioned previously, be aware that every scientific paper contains serious errors. If your errors are not caught before publication, you will eventually have to write an erratum to the paper explaining (a) how and why you messed up and (b) that even though your experimental results are now totally different, your conclusions needn't be changed. Errata can be good for your career. They are easy to write, and the convention is to reference them as if they were real papers, leading the casual reader (and perhaps the *Science Citation Index*) to think that you have published more papers than you really have.

Some journals require a conclusions section, these are very easy to write. All you have to do is to take your abstract and change the tense from present to past. It is considered good form to mention at least one relevant theory only in the abstract and conclusion. By doing this, you don't have to say why your experiment or observations does (or does not) agree with the theory, you merely have to state that it does (or does not). *In conclusion we present our method of writing scientific papers, the importance of which was timely since our university has exerted considerable pressure on us to publish more papers and since this was not peer-reviewed we wrote whatever we liked and still received considerable credit for doing so. Our contracts have been renewed causing suitable relief.*

Galley Proofs

About 12 months to 2 years after first sending your manuscript to the editor and having passed through the referring process your galley proofs will arrive on the Thursday afternoon before Easter with strict

instructions to proof-read them carefully. The instructions will also implicitly state that all corrections must be made in hieroglyphics using a green ball-point pen. You will have to return to the editor one corrected copy within 48 hours by express courier. It is well worth reading the galley proofs because by now you will have forgotten what your paper was all about. Read it now because about 2 weeks before you receive your copy of the journal someone will telephone or email you congratulating you on your fantastic paper (they were probably one of your referees but will never admit to this). At about the same time you will receive a flood of reprint requests asking for copies of your paper. But by now you will be working on a second or third manuscript and you won't know what on earth they are talking about.

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