ACADEMIA INSIDER

Writing for peer review

A step by step guide

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The ultimate peer-review paper writing guide

Learn the insider secrets of publishing peer-reviewed papers to accelerate your academic career and boost your H-index and other metrics. This guide will cover how to:

- get into the *writing zone* quicker
- learn the formula for writing efficiently
- download the tools for planning and following your progress
- discover the academic superpower others are ignoring

and much more.

Introduction

Welcome to what I hope will be a valuable guide. It will provide you with an advanced understanding of the importance of writing and publishing that is necessary to winning the academic game.

The systems and tips in this ebook have been crafted from over 15 years in research, and upon reflection after leaving academia, on the most important features of the publishing game. Some aspects of academic writing and peer review only became clear to me once I was no longer trying to fight the system.

I am confident that the information in the guide (and the cheat sheets inside) will increase your confidence in your ability to write academic papers and peer-reviewed articles. I also provide you with the structures and tips that will make writing faster and easier, even when you are suffering from writer's block, which, by the way, doesn't exist – it's just our ego stopping us from writing something that doesn't make us look clever. But don't worry, that's what editing is for.

You should allow yourself to write freely and without judgement in the initial stages. However, I'm getting a little ahead of myself...

Why writing peer-reviewed articles is so important

Writing regularly and as early as possible during your research will accelerate your career. This is because despite the constant *important* distractions, it is the only thing that really matters.

Writing peer-reviewed papers is pretty much the only thing that will get you recognition during your academic career. It will open doors to promotions and successful grant applications far quicker than just about anything else an academic can do. That is why writing and publishing should be the activity that you protect the most throughout your career. This is true whether you are a first year PhD student or a tenured professor.

Collecting publishable data and formulating them into a story that is then able to be published in academic journals is a skill that takes some time to completely master. The good news is that it is learnable in a relatively short time, and this guide will show you the best way to do it efficiently.

The problem is that not many supervisors or institutions explicitly tell you how to play this game properly. In my experience, it has been taught through a process of dropping people in at the deep end.

For seasoned academics, it may seem reasonable to just expect people to be able to pick up the important paper-writing skills through a process of trial and error, by osmosis, or through sheer luck. This approach can result in anxiety, confusion, and a steep learning curve that can put people off publishing early on. Delaying learning to write peer reviewed articles can severely impact the momentum of your career in the early stages, however.

Setting the habits and systems for collecting data, publishing your results, and promoting that work as early as possible in your academic career will allow you to quickly build momentum and create the foundations for receiving exponential results throughout the later years of your PhD and early research career.

I have seen many academics (who I considered incredibly talented) fall by the wayside simply because they were unable to master the game of publishing quickly and efficiently in peer-reviewed journals.

The game you need to play and understand

Despite the romantic assertions of universities and professors, academia and the promotion within the university system is a complicated game. It isn't about sitting in your office for hours thinking about your work and it's not about giving your mind a chance to be creative and mulling over ideas. Playing the academic game relies on creating the right collaborations, in standing out as a person worthy of promotion, and in building a reputation of being the next up-and-coming thinker and doer.

The problem is that no one sits you down to tell you the rules of this game or what you can do to win. Generally, people are looking out for themselves and won't want to let others in on the secrets that they have learnt to progress quickly in academia. They also, quite frankly, have no idea why they are successful in the first place, as luck plays a huge role in determining the overall success of any single academic.

Not many people take the time to understand what academia is really about.

Many researchers don't learn that the system in which they are working is a game until far too late in their careers, at which point they are often left feeling angry and disillusioned by the entire academic system.

The fact that this *is* a game means that there are ways to play it and strategies that can make the system work in your favour. I spent far too much time trying to change the system, and not nearly enough time learning to play it efficiently.

My recommendation to any new PhD student or early career researcher is to learn to understand the academic systems and games intimately, so you can hack them.

Publishing peer-reviewed papers in high impact factor journals is the cornerstone of the academia game.

The issue with giving clever people a metric or system to play, means that they will very quickly come up with hacks and shortcuts for getting results quicker and faster. Often, this is to the detriment of the research and integrity of what they are publishing. Nonetheless, quantity over quality is often the winner.

The main part of the academic game involves publishing in peer-reviewed journals, with as high an impact factor as possible, as often as possible. Researchers can get their names on academic papers for a variety of reasons, not necessarily requiring them to undertake the research themselves. This leads to collaborations and questionable contributions to a piece of work, in order to have their name on a paper.

The researchers on the author list of a paper may be gatekeepers to grant money, they may be an associate supervisor, they may have provided *fruitful discussions* during the writing of the paper, or they may have done nothing at all to contribute to the paper but are included for political reasons. There are also instances where researchers are included simply because they are a big name in the field. This practice opens up higher impact factor journals and often reduces peer review and publishing times.

For early career researchers, it can feel like the academic game is designed for those who have already established themselves, and in many respects this is true. However, becoming efficient and collaborative with your paper-writing process will open many doors and will allow you to progress faster than you thought possible.

This detailed paper-writing guide will talk you through everything you need to know about publishing peer-reviewed papers, as well as all of the political, academic, and unspoken rules that govern the process.

What you can expect from this ebook

This e-book will provide you with all the steps, formulas, guides and secrets for publishing peer-reviewed papers quickly and efficiently.

Not only will we look at the act of writing. We will also explore how to ensure you are able to get in the zone faster, how you keep up motivation whilst writing your papers, and the pitfalls to avoid along the way.

One section that I am particularly excited about sharing with you is that on communicating your work after it has been accepted into a journal.

For many years, academics have simply stopped at the publication stage and then moved onto the next paper. They are missing an incredible opportunity to boost the impact of their paper and raise awareness of their own work within their own institution or university, and to a wider audience. This communication technique will be great news for younger researchers.

Academia and more established academics tend to move at a glacial pace when adopting new technologies. By being on the front foot and taking advantage of all the new software and online tools available to promote your work, you will be able to accelerate your career and stand head-and-shoulders above the academic dinosaurs in your institution.

In the next section I share with you the basics of the peer-review process so you can get a bird's eye view of the whole process from start to finish. And... it is always a good idea to get to know your enemy before attacking.

What is peer-review?

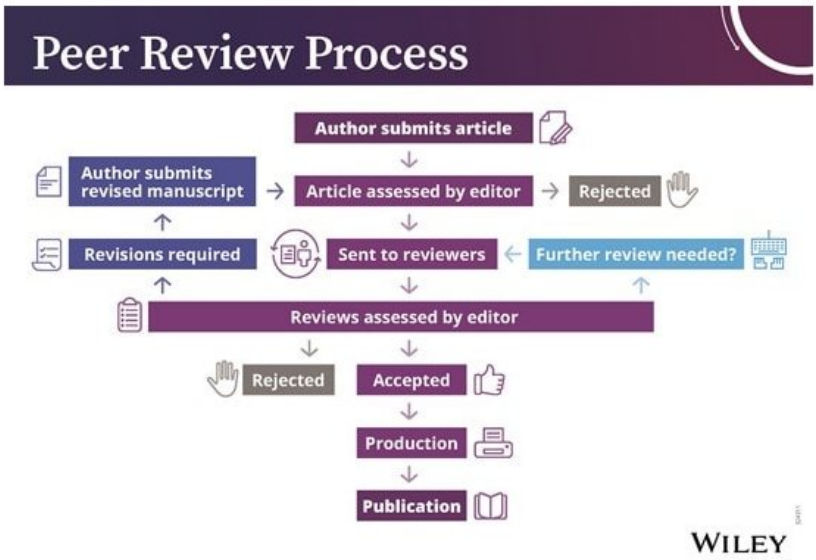
The peer review process is the backbone of research and scholarly publishing.

It exists so that opinions can be separated from facts, and used properly, it can validate the accuracy and authenticity of academic work.

While certainly not a perfect system, it is the best we have for determining the validity of research. It has existed with relatively minor changes for about 350 years.

The peer review process relies on sending research to other academics in the field. Besides ensuring the contents of the paper are accurate and true, it can also help increase the networking possibilities and reach of important work.

The peer review process is a formal part of research communication. The Philosophical Transactions of the Royal Society is thought to be the first journal to formalise the peer review process under the editorship of Henry Oldenburg (1618- 1677).



In its modern form, the full peer review process looks like this:

The basic steps of the peer-review process:

1. **Submission of paper** – the authors submit the article to the journal. This is typically using an online system or via email.
2. **Journal style assessment** – the journal checks the paper's composition and topic against the author guidelines to make sure it includes all the required sections. The quality of the paper is not reviewed at this point.
3. **Editor-in-chief appraisal** – the editor-in-chief checks that the paper is appropriate for the journal and that the subject is sufficiently original for the audience of the journal. A lot of rejections happen at this point if the subject of the paper is not in fashion at the time.
4. **Invitation to reviewers** – the editor sends out invitations to individuals whom they believe would be appropriate reviewers. Typically, they want two or three reviewers for each paper. If the invitations are rejected by the potential reviewers, the search will continue until at least two reviewers are found.
5. **Peer review is conducted** – at this point, the peer reviewers read the paper and form an initial impression of the work and research presented. They will read the work in detail, taking note of things that they disagree with or that they want extra evidence for. The review is then submitted back to the journal with a recommendation to accept, revise, or reject. You can receive requests for major or minor revisions.
6. **Journal evaluates the reviews** – the editor considers all the return reviews and will then make a decision. If the reviews are very different, the editor may invite an additional reviewer or seek an extra opinion from another editor.

7. The editor sends out a **decision email** to the authors that will include any relevant reviewer comments and whether or not the paper has been accepted, rejected, or if the reviewers are asking for a revision.
8. **Outcomes** – If accepted, the paper is then sent to production and for formatting. If rejected, the authors are encouraged to submit to another journal and, sometimes, the editor suggests a sister publication. If there are revisions to be made, the reviewers may expect to receive a new version of the paper. If the revisions are only minor, the editors may be able to handle that without sending it back to the original reviewers.

These steps are common and ubiquitous among different fields and journals, although there are different types of peer review that can exist.

The different types of peer review

The process of peer review comes in different forms. Before submission, you should check the journal's peer-review process, as it may differ from others in the same field.

Each different system has its own advantages and disadvantages, and one type of review process will often be preferred in a certain field. For example, in chemistry and materials science, I predominantly had two reviewers who knew my name and institutional affiliation, but I did not know who they were. This led to some harsh comments about my work.

The types of peer review are:

Single anonymised review

The names of the reviewers are hidden from the author. This is the traditional method of reviewing and is the most common across many publishers and academic fields.

This type of review allows for impartial decisions, as the reviewers are less likely to be influenced by the author's status or reputation in the field. One downside is that it can cause unnecessarily harsh and critical comments by the reviewers who can hide behind their anonymity.

Another important factor to consider is that authors are sometimes concerned that the reviewers could delay publication in order to publish a similar paper before them. This is a particular issue in fast moving and *hot topic* fields.

One of my supervisors used to say, 'No-one remembers the second person to discover something'. I think this is an indication of the unnecessary fear and stress some academics put themselves under.

My advice would be to focus on what you can control and forget the things outside of that. You'll be more focussed, and the process will be much less stressful for you.

Double anonymised review

Both the reviewer and the author are anonymous.

The advantages of a double-blind review are that the anonymity limits reviewer bias and subconscious prejudice based on the author's race, gender, institution and age. Another great aspect about this form of review is that articles written by prestigious or renowned authors are considered entirely based on the quality of the work in the paper rather than on their reputation.

There is also another, even more anonymous form of reviewing that is rather scarce, despite its benefits.

Triple anonymised review

Reviewers are anonymous and the author's identity is unknown to the reviewers AND to the editor.

In reality, this form of peer review is very hard to implement in the real world because the editors and the reviewers may recognise particular research and be able to identify the research group or individual author. The majority of fields are relatively small and clues from the subject matter, citation patterns, or writing style may be a give-away as to which group released the paper.

Open peer review

Open peer review offers greater transparency during and after the peer review process.

The most common type of open peer review is where both the reviewer and the author are known to each other during the process.

Many scientists and researchers believe that this is the best way to prevent malicious comments, to stop plagiarism, and to prevent reviewers from unnecessarily delaying a paper so they can get the upper hand and publish first.

On the other hand, it may introduce unnecessary cultural behaviours into the peer review process, such as politeness towards more senior academics, all the way to fear of retribution, if a reviewer is to reject a paper from a well-known scientist.

There are many other ways that the peer-review process can be used by individual researchers to game their H-index and citation metrics. They are more common than you would think.

Tricks of the trade

Even though peer review exists to validate academic work, academics have been using the system and structures of peer-review to further their own careers and boost their own H-index. They can do this by asking the authors to cite their own work.

I once had a paper under review and one of the reviewers asked me to reference 20 of their papers. And I did! This is because it was better for me to appease the reviewer (and get my paper published quickly) than cause a delay to the publication and seriously antagonise a potentially senior colleague in my field. This story will be repeated time and time again, and younger academics are most likely to give into this sort of behaviour.

This game can also extend to delaying other researchers' work so that they can publish results before you get a chance to.

Where there are incentives to *be the first,* you can be assured that there are people willing to game the system for their own benefit, even if that means crossing some ethical barriers.

That is the peer review process in a nutshell, and by understanding its strengths and weaknesses you will be able to quickly navigate this sometimes-confusing part of research and academia.

In my experience, the peer review process can be long-winded, mean, and incredibly political – especially when you are considering author order on a paper. There will be more on how to navigate that later. But there is also a huge sense of satisfaction when you finally are able to navigate each of the processes and publish your paper.

Some of my friends absolutely love the moment when they get accepted in the peer-reviewed literature. For me, I considered it just part of the process and it was not something that particularly motivated me to perform research.

Lay the foundations for writing

When I was in the early stages of my academic career, I would have scoffed at this section and skipped over any chapters that were designed to help me *holistically*. Researchers have a natural tendency to be very sceptical. But then, they should be, as healthy scepticism is exactly what a good researcher should bring to every part of their work.

My own scepticism would have prevented me from really understanding how to lay the best foundations for writing peer-reviewed journal articles and furthering my own career.

I wasn't interested in the mindset, process, or preparation around writing. I was much more interested in literally sitting down and writing as much as I could in whatever way I could.

I've certainly mellowed in my time away from academia, and now I consider the foundations for writing one of the most important chapters in this guide.

Ever since my career path took me through the science communication field, I have a greater appreciation for what it means to sit down and write – including the barriers that can get in your way.

I now understand how you can prepare yourself mentally and physically for producing your best work – even when you may not want to. Don't get me wrong, as sometimes I still feel as though I just need to push through whatever is stopping me from writing, with virtual brute force.

I sit and write to a given schedule – no matter what.

Whether it is a lack of sleep, a scattered brain, or any other issue, sometimes you just have to push yourself to write. Luckily for me, days like that are becoming fewer and fewer.

In this section, I will share with you what I have learned from writing for science communication organisations and how I have been able to trick myself into being as productive as possible, even when I don't feel like it.

Writing regularly and setting a schedule for writing will be the easiest and most effective ways of publishing high volumes of high-quality peer-reviewed papers.

Here are the most important factors that I have found influence my ability to sit down and concentrate on writing.

The influence of health on focus

There is no doubt in my mind that the number one thing determining whether I am going to be able to write to my absolute best is my overall health, and therefore, my energy levels.

Over the many years of writing for science communication channels, such as *Australian Quarterly* and *Australasian Science* as well as my own online platforms (where I have been able to maintain a publication rate of about 20,000 words a week for over one year) these are the most important components that ensure I optimise to operate at my best:

Sleep

Getting a good amount of sleep is necessary for me to write at my best. Typically, I get between seven and eight hours sleep every night and if I get less than six hours, I really notice the effect on my ability to concentrate on writing.

My tired brain is not able to put together ideas in a way that enables them to be communicated efficiently. This is particularly true if I am trying to communicate advanced topics. Such areas require a deep understanding of the subject matter before translating them to legible and meaningful sentences for a defined audience.

I don't want to patronise you or tell you that my way of preparing for bed is the best way – you can come up with your own routines and experiments to determine how much sleep you need for a clear head. However, I find that eight hours of sleep is easy to achieve if I have exercised that day (running between 5 to 10 km) and I do not use any screens or consume caffeine or sugar for about one hour before heading to bed.

Try these techniques to get a good night's sleep:

- Avoid stimulants like caffeine eight hours before bed.
- No alcohol – alcohol stops the body from entering a deep sleep.
- Avoid using screens at bedtime – try at least 30 minutes of screen-free time before bed.
- No binge eating before bed – a full stomach will disrupt your sleeping.
- Create a sleep-friendly bedroom – a dark, quiet and cool room will help you get the best night's sleep.
- Avoid long weekend lie-ins – this can actually give you the same feeling as jetlag on Monday mornings.

Without an adequate amount of sleep, I struggle to do any focussed work.

Exercise

I used to be completely averse to exercise. It took me until the age of 35 to really get an appreciation for what exercise can do for my mental and physical health.

I did the Couch-to-5K training program, which enabled me to get my running stamina from less than one minute, all the way up to running continuously for 30 minutes.

A year after completing that training program, I am now running up to 18 kilometres in one go.

I'm in no doubt that running (or doing exercise) regularly helps me to focus and become a better writer.

On the days that I run, I feel much more capable of focusing and remaining positive about my own writing. You see, writing is just as much a mind game as it is an academic process.

Being able to push through your own mental hurdles to get the words down on the page is the first barrier to writing. And some people find that barrier far too high – leading to writer's block brought on by perfectionism and a fear of *doing it* wrongly.

Exercise has been the key to help me push past my own mental hurdles. I have been able to write more, and more frequently, with less writer's block.

Even if you are not into running or exercising in general, I recommend that you put into your routine some incidental exercise such as walking a certain distance to your university or institution, going for a walk at lunchtime, choosing the stairs instead of the lift or escalators, or anything else that keeps you from being sedentary throughout the day. Even a little bit of activity can also go a long way to clearing your mind.

Diet

Over the past year, I have been experimenting with my diet and taking notes on how it influences my ability to write in focussed 1½ hour blocks.

Not many things have really made a huge difference but here are the best outcomes from all my self-experimentation:

Fruit for breakfast

I have found that eating fruit for breakfast has increased my energy levels in the morning and created a small rush of energy just as I sit down to write – as long as I eat about half an hour before I need to concentrate.

I first found out about the power of consuming fruit while I was in my undergraduate chemistry course at the University of Wales, Swansea.

Half an hour before the beginning of each exam I would consume one or two bananas. The natural sugars gave me a boost of energy and mental clarity that enabled me to stay focussed throughout the hours-long exam.

Since discovering *banana power*, I have been trying ways to fit it into my daily routines.

My recommendation would be for you to experiment with different types of foods and monitor their effect on your ability to focus and to write. I think you will be surprised at how much of an influence diet really has on your ability to write peer-reviewed papers. Every tiny bit helps to keep you focussed during writing.

Limiting sugar and caffeine

Other than consuming fruit in the morning, I have found that limiting my intake of caffeine and sugar has kept my energy levels more consistent throughout the day.

I used to drink a fair amount of coffee – somewhere between 4 and 5 cups a day. I would rely on it to push me past any hesitation in starting my writing. Coffee and sugar were a powerhouse combination, providing me with the nervous and erratic energy required for getting a lot done.

I would sit and write for a good half hour, then the crash would come and all that nervous energy simply turned into anxiety and self-judgement.

Once I gave up my sweet coffee, I realised that the sugar and caffeine crash that accompanied the coffee and biscuit binge was quickly followed by another crash that meant the last moments of my 1½ hour focussed writing blocks would be pretty much wasted. Wasted in the sense that what I had written was complete garbage and I'd have to re-write the section.

I found that my ability to write was much more consistent if I didn't rely on artificial stimulants such as caffeine and sugar. And even if I didn't want to write, my writing was more consistent throughout the 1 ½ hour focussed work writing block.

Now that we have covered the internal stuff that I have found to increase my mental focus and energy levels, let's take a look at creating the perfect external writing environment.

Prepare a writing space

I used to write wherever my desk was. The modern office's love for open plan office space has really put a dampener on productivity. No one asked for it, and it is not anyone's preference to have an unlimited source of distractions.

How do I know?

Most open plan offices have individual (lockable and screened) rooms for the supervisors to work in – if open plan is so great, why do they need their own space?

The fact is, everyone can work better if they are able to lock themselves away somewhere.

I have found that having a dedicated space for writing helps me get into a certain headspace. When I was in academia, whether it was Masters or PhD, I would always find a place to write that was separate from my office space. Too often, my office space became a place where I would simply browse the Internet for hours on end, distracting myself from the most important tasks that I needed to complete.

Often, my writing space was the quiet area of a library, a hot desk in a communal co-working space, or any other quiet nook I could find in my university.

Silent study areas and dark corners of the library seem to be the best spots.

My Masters thesis was fuelled by chicken sandwiches from the café situated on the ground floor of the library that I used as my writing sanctuary. In Newcastle University library, there were small booths lined up against the wall on each level that created a perfect little distraction-free box in which to work.

I would simply write for 1 to 2 hours twice a day in that tiny distraction-free box until I had finished my thesis.

If you are in shared office or open plan space, I highly recommend that you find a space that is outside your office where you can tuck yourself away for an hour or so at a time.

My experience tells me that the shared office experience that comes with being a PhD student or an academic is not conducive to productivity. I would easily get distracted and side-tracked by my office mates and it seemed as though we were there to provide the best possible distractions to each other. From funny online videos to afternoon drinks, I'd always welcome the distraction.

If you find noise is a particular distractor, I recommend using a white noise app, such as *My Noise* (https://mynoise.net) to drown out the shared office space hustle and bustle. There was a time where I couldn't work without using white noise.

Routine

Crafting a sustainable writing routine throughout your PhD and academic career is one of the most valuable things you can do for yourself. A routine is like manufacturing a *Groundhog Day* that you repeat over and over until you get to your end goal.

Most of the time we work on the easy things that do not allow us to actually reach our end, long term, goals.

Ask yourself: What two or three activities actually get me closer to my end goals?

When you have the answers, you must make sure that you prioritise these career boosting activities and do them every single day, avoiding all distractions to the best of your ability.

Avoiding distractions and *shiny new things* is going to be harder than you think. You'll need to focus on these activities for months and years at a time. The human brain (or at least *my* brain) is drawn to novelty.

As I say, staying focussed on your two or three most important activities, to the exclusion of most others, will initially be really hard. With time, it does become easier, especially when you start seeing the results of the hard work you are putting in.

Create your perfect routine

Creating your perfect routine really comes down to understanding when you are naturally most efficient at writing. For example, I often write first thing in the morning when I feel the most focussed, and then again for an hour after lunch. This gives my body enough time to change from digesting my food to it being turned into energy to fuel my writing.

An academic career is more like a marathon than a sprint. Performing a writing task for one hour a day, over a month, is much more sustainable than trying to write a paper in a weekend.

Create a routine that you can perform over years and avoid burnout at all costs.

Once you get into the habit of writing, it can feel weird when you break it.

My recommendation is to set aside at least four hours every week for sessions focussed on writing. This could be working on figures, producing tables, writing introductions, method sections, or piecing together a story from the data that you have available.

Start with 45-minute blocks and work your way up until you can work for 1.5 hours with no break.

Starting is sometimes the hardest part, but the act of starting writing is the boost you need to continue writing for an hour or more.

If I ever feel as though I can't be bothered, I trick myself by sitting down for at least 10 minutes only. I find that as long as I've got past this initial hesitation, I'm then able to write for much more time than I thought I would be able to.

Tools

These are the tools you can use to help promote a healthy lifestyle to get the most out of your focussed writing tasks:

Healthy sleep

- Sleep Score (https://www.sleepscore.com) – the leading app for getting enough sleep and analysing if you need more.
- Sleepy Time (https://sleepyti.me) – I use this to calculate when I should go to bed so that I wake up at the end of a sleep cycle instead of in the middle of one.
- Solar simulator alarm clock (https://amzn.to/3zHdlD1) – I bought one of these a while ago and I love it. It wakes me up slowly in the mornings — and there's science to back it up too. I hated waking up in the dark to an alarm clock beeping away. This changed my life.

Activity timers

- I use Interval Timer app on my phone to keep track of focussed work times and anything else (like exercise and stretching). I found that without a timer I trick myself into working less. (https://play.google.com/store/apps/details?id=cc.dreamspark.intervaltimer&hl=en&gl=us)
- Pomofofus (https://pomofocus.io) – If I need to focus, this is another timer that I fine useful.

White noise

My noise (https://mynoise.net) – A lifesaver when working in noisy environments and open plan office spaces. When I was in a shared office, I couldn't work without it.

The first steps of writing for peer-review

Staring at an empty page, knowing that you have to write an article that will be sent to experts in the field can be very intimidating. Like most things, taking small and calculated steps towards your end goal is the most efficient way to getting there.

In this section, we will go over the steps necessary in order to produce the first draft of your paper.

Scientists and researchers tend to be perfectionists. This is unsurprising, when it is these traits that have got us where we are. However, for the sake of getting this first draft completed as quickly as possible, you need to set aside your inner perfectionist and allow yourself to make mistakes while writing. Let go of not having perfect grammar and allow yourself to spill your brains onto the page, whether it makes sense or not.

Editing, and revisions from your collaborators and supervisor will help weed out all the mistakes.

The first place I like to start when writing a paper is to take a step back from my research and, based on what I have recently discovered, I ask myself if it forms a *complete story*: one with a beginning, a middle and natural end point.

It isn't until I start putting these building blocks together that I really get a good handle on whether I have sufficient data for a full paper.

Have you got a story to tell?

When you consider the data you have collected, can you tell a complete story with a sensible and natural stopping point?

The one thing I have noticed about peer-reviewed papers is that pretty much every reviewer says that you should look at another aspect of the research field or data. Typically, this relates more to their research than yours, but knowing where your story ends will help you argue the point that their suggestion is *outside the scope of the research* or constitutes *further and future work*.

When deciding whether I have a story to tell, I often look at the problem first.

The problem

The likely reason you are doing research is to tackle a problem. If you are writing your thesis, your problem is much grander and bigger than what is capable of being presented in a peer-reviewed paper.

Typically, PhD theses work on a rule of thumb of one peer-reviewed paper per chapter. Each chapter in your thesis is a mini story that exists as a small section of your overall research.

Defining the problem that your peer-reviewed paper will tackle enables you to set boundaries on the scope of your paper.

The problem under discussion should be able to be defined in one or two sentences. It could be that there is a lack of data, or a gap in the literature you are filling. It may be that others have overlooked a certain area of the research; it may be that someone is completely wrong in another paper; or it may be a practical application of research that tackles a real-world issue such as addressing efficiency, cost, application, or the speed of a process or application.

The problem you are solving is the foundation of your paper. Making sure that important component is well defined and has a natural limit will speed up the review process by giving the peer-reviewers an obvious framework in which to judge and review your work.

Write in 2 sentences the main problem your paper will address:

Examples from other peer-reviewed papers include:

- The long-term stability of perovskite solar cells is still underdeveloped.
- Little is known about how prior social experience, internal states, and group composition shape behaviour in groups.
- Operationalising and comparing measures of social processes and outcome success in biophysical indicators remains challenging for resource managers.
- The people who live alongside this elephant population are affected by intensive crop foraging. Our study investigated the factors that influenced attitudes toward elephants.

The solution and what is new

After you have defined the problem of your research, you need to collect together the results that will provide a direct answer to the problem you have defined previously.

To be taken seriously, you need to be able to convince the reviewers that you have produced something new and novel. This can be that: you are the first research group to discover something; you have analysed something in a different way to previous papers; you may have alternative theories that your data supports; or you may be combining several techniques and methods to provide a new perspective on something.

In my experience (in the materials science world), I was easily able to create something new by combining materials and methods that had not been previously utilised together, to create a new material with fancy properties. Those properties could be increased conductivity, transparency, reflectivity, rigidity and structural integrity, or something else. Then, I simply took this material and analysed it in a variety of ways to show the reviewer that I had actually fabricated what I claimed to have made.

You need to approach this to convince someone of something, so that without a shadow of a doubt, they believe what you say. I've reviewed many papers during my time in academia that regularly provide evidence that is easily refuted or that simply make statements and conclusions that the writers' data does not support.

Starting with the broadest possible solution to the problem, as above, allows you to play devil's advocate with your data and to home in on the techniques and methods you have used to support the solution.

Sitting down with someone in your field who isn't part of your research group is a fantastic way to see if your arguments stand up to criticism from an expert. You may find that a simple hour-long conversation with the right person will easily highlight the gaps in your logic, allowing you to then fill those holes with further research and explanations.

Write a paragraph on what your solution to the problem is. What is the new contribution?

Examples of the literature:

- We measured microplastics in digestive tissues of specimens collected from the years 1900–2017 and preserved in museum collections. We collected new fish specimens in 2018, along with water and sediment samples... for each individual, we dissected the digestive tissue from oesophagus to anus, subjected tissue to peroxide oxidation, examined particles under a dissecting microscope, and used Raman spectroscopy to characterise the particles' chemical composition.
- This result constitutes the first evidence for the decay of the Higgs boson to second generation fermions and is the most precise measurement of the Higgs boson coupling to muons reported to date.
- Firms with gender diverse boards have more patents and novel patents, and a higher innovative efficiency. Further analyses suggest that gender diverse boards are associated with more failure-tolerant and long-term chief executive officer (CEO) incentives, more innovative corporate cultures, and more diverse inventors, characteristics that are conducive to an improved innovative performance.

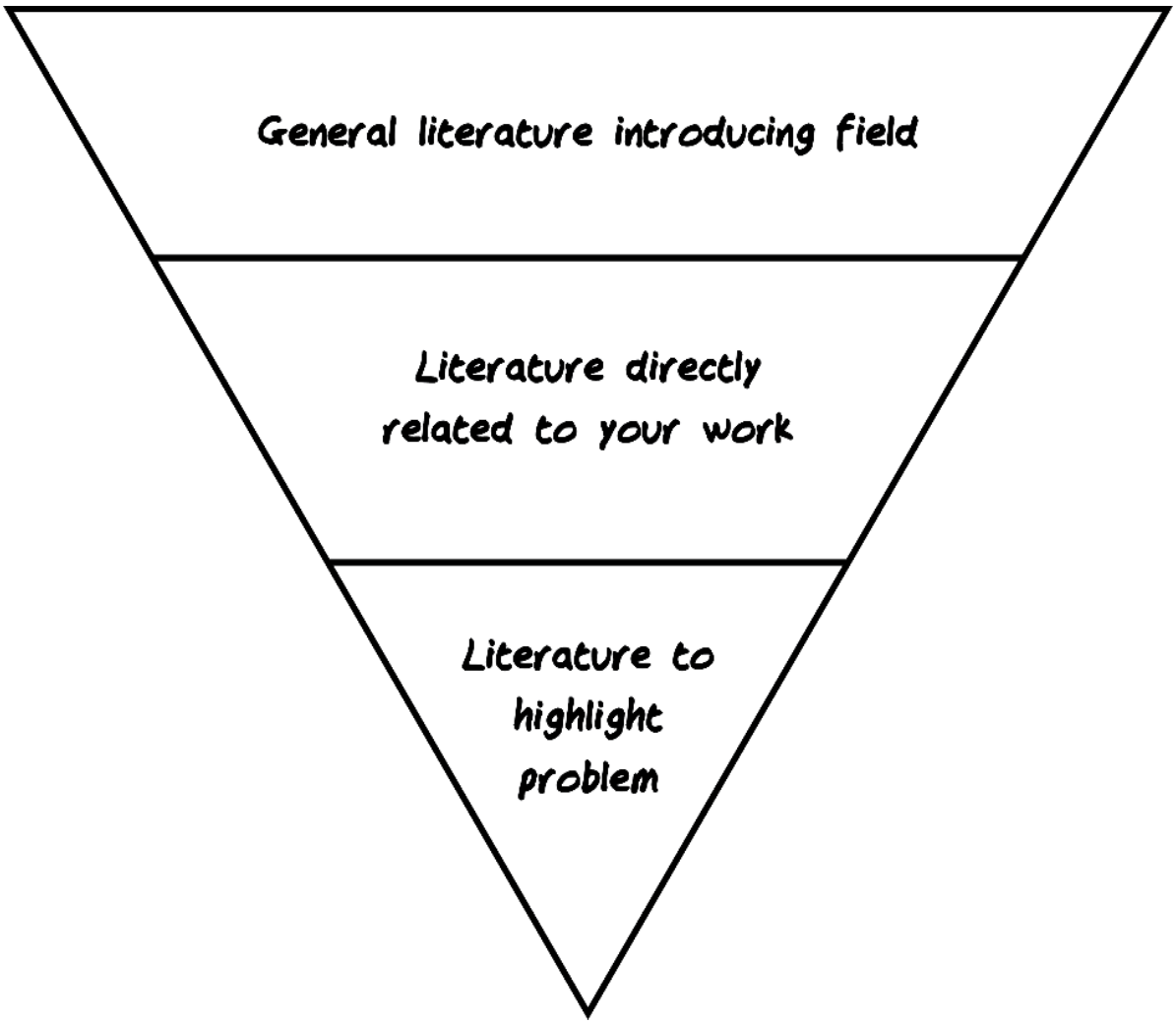
The background

Your research does not exist in isolation. You need to consider the most important articles in your field that provide you with a foundation on which to build your scientific argument.

There is so much research that it can be overwhelming to try to figure out which papers to cite in your peer-reviewed paper in order to provide enough background for someone to understand where your research is positioned in the grand scheme of things. Ultimately, all you need is enough previous work to justify the problem you are stating you have solved.

The way that I have typically justified the need to solve my problem is by looking at the problem as an inverse pyramid with my specific research field at the bottom (the apex of the pyramid).

Starting broadly, I would often define the background as a large overarching issue. In my case, this was global warming or renewable energy. I would then focus narrower and narrower with my cited literature. Starting with global warming, then going down to ways that we tackled global warming, then looking at solar panels, then looking at a very specific type of solar panel, and then this opens up the ability to discuss the problem with that solar panel and how my research has addressed it.



Read the introductions of papers in your field in order to understand where the best place to start is – how broad the initial sentence is – and how quickly they narrow to literature directly related to their problem. Then, use this as a model for the background information of your story.

Future work / limitations of your study

In the future work section of the cheat sheet, enter the next logical step of your research. Research can and will go on forever, and being clear about where your research stops and what the future work of your research will be, indicates to the reviewer that you understand the limitations of your data and what you will need to do in the future to address them.

Where does your research stop – what doors does it open for more research?

Examples from other articles:

- Our findings suggest that future research should delve further into the relative impact of societal and organisational cultures on the work-nonwork interface. In addition, future studies might look at other societal-level variables, e.g., the relative health of the economy and/or demographic differences.
- For a further improvement in fill factor, future research should be focussed on minimising trap-assisted recombination, aiming to approach the theoretical fill factor limit of about 90%.

It may not be this clear cut

It may appear from the previous steps that people start writing a paper when they have a clear answer for each one of these sections. The reality is much messier than that.

Many times, I have started writing a paper simply because *I need to write a paper* without a clear understanding of the problem that I will present in the paper or of the data that I will pull together. This is a common theme that pops up if you haven't dedicated enough time to writing in the early stages of a research project.

If you start writing your problems and solutions and you realise that you are overstretching, or it doesn't quite make a complete story, you have the capability of massaging the limits of the problem so that they match with the data.

Remember that it is your story you are telling, and changing the limits of your paper to fit into the data that you have already collected is perfectly reasonable, as long as you are still contributing to the scientific discussion.

Sure, you may want to bring together as much data as possible to answer a massive research question and aim for a high impact journal, but sometimes the pressure to publish doesn't allow it. Many researchers settle for a smaller story based on the evidence they have collected, and that is perfectly okay.

Once you have decided on the data that best supports your solution and provides evidence that you can solve the problem the paper is focussed on, you should next focus on collecting all of your relevant data into one file.

Collect all relevant data into one file

Once you and your collaborators have decided on a problem that you think your data can solve, I recommend copying all your data into a single file so that it is accessible to all collaborators, and it just simply brings all of the data and components of the paper together.

I recommend a file structure like this:

- Awesome paper one
    - Writing
        - Cheat sheets (from this guide)
        - Drafts
            - V1.0
                - Figures and tables
                - Supplementary information
            - V2.0
            - V3.0
            - etc.
        - Final Draft
            - Graphical abstract
            - Figures and tables
            - Supplementary information
    - Data
        - Method/instrument 1
        - Method/instrument 2
    - Submissions
        - Journal 1
        - Journal 2

Create a folder on your computer that has the temporary title for your paper. Once you open this up you should have three subfolders titled: writing, data, and submissions.

In the writing subfolder, you should have other folders that include cheat sheets (those provided as part of this guide), versions of each draft, and final draft, which is the final version that all collaborators have agreed on and is ready for submission to a peer-reviewed journal.

These working files can be shared on a folder on a Google drive, Dropbox, or other collaboration- and cloud-hosting software of your choice.

Once you have this folder structure in place, you can start assembling the figures and tables to help you weave together your story.

Lay out the results narrative with the figures and tables

Starting with the placement and order of figures and tables is the easiest way to lay out the structure of your argument.

I like to print out all the figures and tables and place them on a large surface, so that I can see that a natural and logical link between the figures supports my research findings. In my field of materials science, I regularly had five to eight figures and a couple of tables in my research articles.

I often sat down with my printouts and a collaborator so that I could easily describe to them what I had found out, and the figures and tables would naturally fall in the order that I was describing the research.

Once this order is in place, writing is straightforward since all you have to do is write a few hundred words of explanation under each table or figure, which then weaves together a story to support your conclusions.

I found that it's much easier to write a couple of hundred words under sequential figures and tables than it is to produce a few hundred words without any visual structure to follow. This will boost your motivation as you see things coming together quickly.

It's important to note that the visual elements such as figures, charts, maps and tables that helped summarise and illustrate your findings should be able to stand on their own. This means that the caption should include enough information to understand the figure, chart, or table without having to find and read the paragraph in which it is first mentioned.

Formatting and legibility

Charts and tables can easily become confusing if they are not formatted well. Remember to follow these simple rules to make sure your tables and charts are legible when printed in a journal:

- Make sure the text and legends are readable (large text)
- Do not rely solely on colour to differentiate between data sets – make it so you can still differentiate between data sets when printed in black and white
- Save the files at high resolution (.tiff or .png)
- Follow all journal guidelines
    - Figure width
    - File type and resolution
    - Colour or black and white
    - Font size and type
    - Line weight

A figure easily becomes a distraction if no design thought has gone into it.

Biorender is a new service that allows you to create professional figures and schematics quickly and easily. I know they have a range of drag-and-drop solutions for creating figures for a range of different subjects.

Personally, I have used Inkscape to make vector (scalable) graphics for a range of papers. There is a bit of a learning curve but after watching a couple of YouTube videos it'll start to make sense. Using a colour pallet from https://coolors.co and sticking to the golden ratio for sizes and layout of items seems to be the ticket for producing awesome figures.

Reference manager

Choosing a reference manager that you are comfortable with and that slots into your word processor of choice will save a lot of time formatting and creating the bibliography. Virtually every researcher uses some form of reference manager – only the old school researchers still use Excel.

My bibliography and reference manager of choice was Mendeley.

It doesn't necessarily matter what software you use but it should have the following features:

- provides support for populated operating systems
- allows the organisation of references into groups or folders
- allows you to attach files to references
- has the ability to export and import several file formats
- allows integration with your text processor of choice (typically MS Word or LaTex)
- has customisation of reference styles.

There are some web-based only platforms such as BibMe, Citethisforme and EasyBib but often people choose desktop-based software that has the ability to create groups and share folders such as Citavi, Colwiz, EndNote, F1000Workspace, Mendeley, RefWorks, and Zotero.

Getting to grips with a reference manager that you are comfortable with and that integrates well with your writing process will remove one of the biggest hassles of writing and reformatting a peer-reviewed paper.

A simple push of a button imports and updates your references as you write.

Get yourself an author ID

There are millions of researchers and scholars and many of them share many name similarities, for example, a surname or first name and middle initial combination. This situation can lead authors with an existing publication record to lose track of some of their work and have it misattributed to someone else.

Getting a unique identification number will mean that your work will be associated with you and no one else. There are many types of identification services available for researchers but one of the most popular is Open Researcher and Contributor ID (ORCID).

ORCID is a free service that assigns a unique identification number for every author of a scientific document. Authors can create a profile with personal and professional information and receive a 16-digit number assigned as a unique identification token.

Set a deadline and times to write

Now that you are ready for writing and cranking out those words, it's time to set yourself a time goal and create space in your calendar to write.

Writing for publication during a PhD or for academia is something you should do regularly and deeply.

Continuous small efforts quickly compound into big results. Take a look at your weekly schedule and divide it into morning tasks and afternoon tasks. This gives you 10 deep worktime allotments each week, that is, Monday morning, Monday afternoon, Tuesday morning, Tuesday afternoon, and so on.

In each one of these time segments, you should aim for 1½ to 2 hours of undistracted work. You can either contribute towards your original research (get into the lab or focus on reading), analyse data, organise data, prepare for upcoming conferences or presentations, or write for a peer-reviewed publication or other written communication such as a thesis or a grant application.

You should allocate between three and four of these time segments for writing a week. If you want to get the first draft of your paper done quickly, you should aim to work on it every single day.

I choose to do most of my writing in the morning as that is when I am well rested, and I am able to think clearly. If I was aiming to write a paper quickly, I would dedicate every morning from Tuesday through to Friday for dedicated writing and editorial work on my paper.

Once the first draft of the paper is complete, I can then use these allotments for other writing tasks or further research activities.

Make your progress visual and obvious

Before you start writing I strongly recommend that you create a highly visual system to keep your motivation high by tracking progress.

For example, you may want to create a check-sheet and place a tick when each section of your paper has been drafted, when looked at by a collaborator or supervisor, corrected, finalised, formatted, and submitted.

Section	First draft	Supervisor feedback	Collaborator feedback	Final draft	Formatted for Journal	Submitted
Title						
Abstract						
Introduction						
Methods						
Results						
Discussion						
Conclusion						

Visually seeing the progress in front of you is a much bigger motivator than simply trudging through until you get to the end. It also gives you a simple visual summary of exactly where each section is up to and how many steps you have to go before it is finished.

An online version of this is achieved with a kanban board such as Asana or Trello. Having columns for each stage of the writing process will allow you to move the section card through the process until it reaches the final stage – ready for submission.

Once you have all the appropriate preparations in place, you are now ready to start writing your peer-reviewed paper. If you have prepared properly, you will find the writing process quick and simple.

Tools

These are some awesome tools for creating figures and tracking your progress.

Software to make figures

- Autodraw (http://autodraw.com/) – draw what you want, and the Google AI will turn your sketch into a beautiful icon. Perfect for creating figures if you don't have an artistic flair.
- Biorender (https://biorender.com) – an incredible new tool for creating professional science figures in minutes.
- Coolors.co (https://coolors.co) – an easy way to create a simple but effective colour pallet for your figure (if you need to).
- GIMP (https://www.gimp.org) – I used this for years to edit my figures and to create awesome looking photo-based figures. It's free.
- Adobe Photoshop (https://www.adobe.com/au/lead/creativecloud/photoshop.html) – I use this now, because I use Premiere Pro to edit my YouTube videos, but it is no better than GIMP in my opinion, and at a greater cost.
- Dia (http://dia-installer.de) – can be used to create structured diagrams and flow charts.
- Inkscape (https://inkscape.org) – my favourite vector graphic editing software. I have spent a bit of time learning how to use this on various YouTube videos – it's an investment you won't regret. It's free.

Track your progress

- Asana (https://app.asana.com) – I use Asana to track projects and writing as it has a very generous free plan and I prefer the user interface over anything else I've used.
- Trello (https://trello.com) – Many people love Trello so if Asana doesn't do it for you, give this one a go.

Writing

You can now see how much preparation should go into paper writing before you even write the first full sentence of your introduction. Hopefully, with all the steps I have outlined, you are ready and raring to go with your peer-reviewed paper writing.

There are still a few little tricks you can use to help organise your thoughts and slowly build up to a full paper.

It's time to open up your word processor of choice and start spilling out the information on to the page. At this point of the writing process, we are not looking for perfection. We are literally spilling out all the important information onto the page and allowing our thoughts to turn from bullet points to full sentences in a couple of steps.

Create headlines then add bullet points

The first step to writing your paper is to create the headlines (abstract, introduction, methods, results and discussion, conclusions, acknowledgements — and any other section required for your field), then populate each headline with a series of bullet points that you will expand on later.

Feel free to add as many bullet points as required under each of the headlines and section titles. By using bullet points you can quickly get all your ideas out of your head and onto paper. Don't worry necessarily about ordering them amongst themselves, just make sure that they are under the appropriate heading. We'll be expanding these bullet points out into full sentences later.

Now, let's take a look at the different sections and components of your peer-reviewed paper and note some of the most important aspects of each one.

The title

The title is of primary importance. That is because not many people will read past the title before citing it.

How do I know this? One of my most cited papers is regularly cited for its title rather than for its contents. It is often cited in the introduction section of other papers and, when it is cited for its results, they often get it wrong or misrepresent the data.

Do I mind? Well, during my time in academia, any cite was a cite. I would take whatever I could get to boost my H-index.

My point here is that if you craft a highly citeable title, you may end up with many more citations than you thought you could obtain.

The perfect peer-reviewed paper title should:

- give an insight into the conclusions of the paper
- contain important keywords that people are searching for
- contain no more than 15 words – the shorter the better
- avoid unnecessary words and field specific jargon

Keywords are a very underutilised part of writing for peer-review.

Keyword research

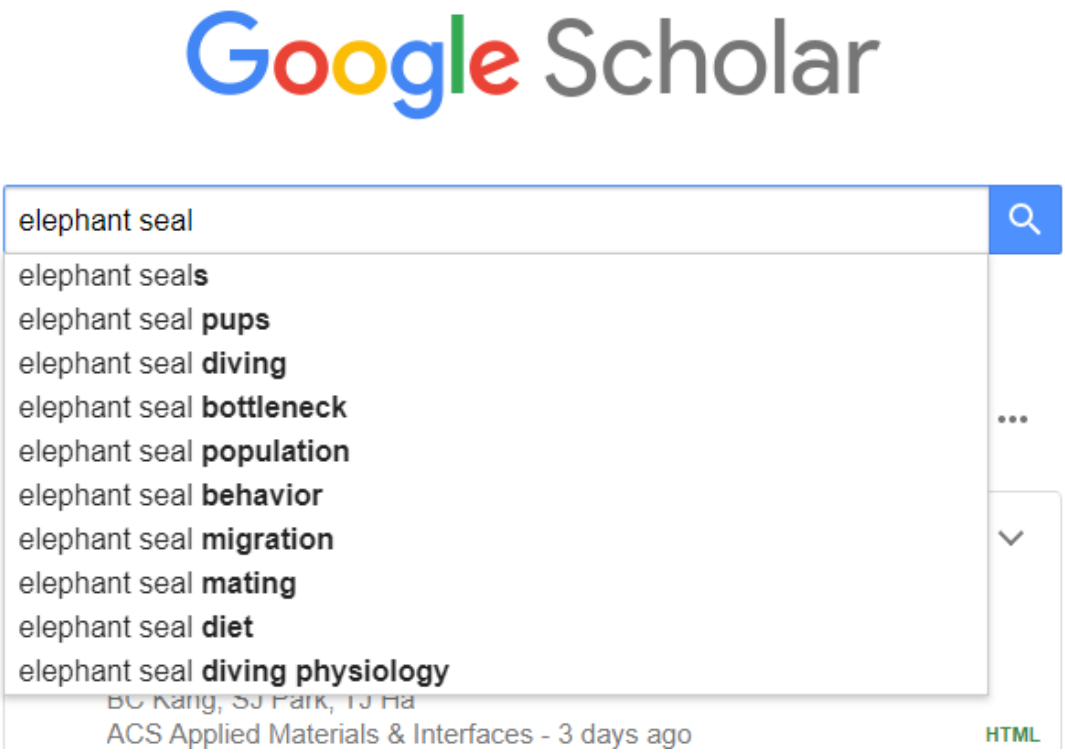
Keyword research is something that a lot of academics simply do not know about and do not factor into their title or abstract writing.

The keywords in your title are there to make it easier for search engines to match your paper to a search term typed into Google or another search engine.

The reason they are so effective is because people are quite lazy when it comes to finding literature to support their findings and to cite in their paper. Ultimately, people will go to Google (or something like Google Scholar) and type in what they want to be able to cite. If your keywords match up with what they are googling, you'll end up with more citations.

Finding keywords to sprinkle throughout your title and abstract is relatively easy. You simply head over to Google's keyword planner or keyword services such as Keyword Chef or Answer the Public to discover what people are typing into Google around your subject area.

One particularly powerful technique is to head over to Google Scholar and start typing in search terms that you would want your paper to show up for. If it is in the auto complete, you can be sure that enough people are searching for this term that it is worth targeting in your title, abstract, and keyword list.



If you find that you don't have many results for your very niche area, keep broadening into wider and wider fields until you find keywords that match your study.

Author order

The author order is something that causes more arguments than any other part of the paper. It can certainly bring out the worst in people and that's because there is a long history of which author should be in which position.

The two most important positions in a peer-reviewed paper are the first and last positions.

The person who appears first has done the majority of the research and typically has written the majority of the peer-reviewed paper. The person at the end of the author list is typically the supervisor of the first author and has attracted the money to be able to fund the research presented in the paper.

They can both be corresponding author – which means that if anyone has a question about the paper, they contact this author.

Corresponding author can be another highly contested aspect of the author list.

Because the two outside authors are the most prestigious placements, the middle author has contributed the least amount to the paper. This person has contributed the least to the experimental results and writing of the paper, but just enough to escape the acknowledgement section.

Then there is an inverse bell curve of importance that runs from one author to the other. Knowing exactly where to place each author on the list can become complicated. But there is an easy way to escape the politics involved.

Dealing with politics

If I have to deal with the political nightmare of arranging the author list and people are being difficult, I tackle this by sending out an email to all the authors and I ask them to bullet point exactly what they contributed to the paper.

Some journals ask for this information if you have a large number of authors. I often play it off as a required part of the submission.

By getting the authors to explicitly state exactly what they have contributed to the peer-reviewed paper, they can't hide behind intimidation or seniority. The evidence comes back to you in black and white. I even had one supervisor who once told me that he shouldn't be on the author list because he realised that he didn't contribute anything to the paper. This supervisor was quickly relegated to the acknowledgement section.

Abstract

The abstract of your research paper is a short summary of your work. It is usually a paragraph that is approximately seven sentences long and contains up to 250 words.

A well-written abstract serves the purpose of giving the reader a chance to skim the results of your work to decide whether or not to read the full paper. It gives the reader an idea of the methods and arguments that you use in your full paper and provides enough information for people to cite without reading the full paper... Yes, that part is true.

The title and abstract are sometimes the only parts a researcher can access without paying to do so. This means the easier it is to cite without having to read the rest of the article, the more likely it is to boost your H-index. I'm not saying this is an ideal practice, but it's a reality of academia.

Search engines and databases use abstracts to help people find your paper when searching online so it is also very important to include keywords in your abstract too. The abstract is sometimes the only thing reviewers see before agreeing to review the full paper, so it makes sense to spend a bit of time wordsmithing it.

Because this section is so brief, it is easier to follow a formula for writing than it is to create from scratch every single time. A good abstract normally contains:

- a sentence to provide context or background information (the very top of the introduction pyramid)
- what information currently exists in the field to provide context to your problem statement
- the primary problem that your paper solves and why current research doesn't address it
- a brief summary of the research methods
- your main finding, results, or assertions
- the implications of your research findings and significance for the reader.

A good abstract needs to be simple, specific, clear, unbiased, honest, self-sufficient, comprehensive, scholarly, and not be misleading.

Use this table to structure your Abstract:

Write a sentence to provide context and background information.

Write a sentence or two explaining

related literature.

Write the problem your paper addresses.

How did you do it?

Methods.

Summarise your

main findings.

Implications of your research.

Depending on what field you are publishing in, you may be provided with a structure to follow. Structured abstracts are becoming more and more popular, and they simply ask you to populate some information under subheadings such as context and background: objectives, design, setting, participants, main outcomes, results, and conclusions. Some journals stick to the standard IMRAD format for the structure of their abstracts, and this includes introduction, methods, results, and conclusions.

Even if your target journal doesn't ask you to follow a specific abstract structure, I would recommend structuring yours in a similar manner because they are easier to read and remember: this makes them perfect for peer review.

Another common structure for an abstract includes the four-point structured abstract:

- background
- methods
- results, observations or findings
- conclusions

No matter what formula you are using, it's important to religiously stick with the instructions provided to you by the journal. Most journals allow between 200 and 300 words for formulating the abstract and it is highly recommended you stick to that limit.

It is my recommendation that you draft abstracts towards the end of your first draft. This ensures that it accurately represents what is in the main body of the text. Some common tips for drafting an abstract include:

- avoiding passive voice
- get rid of as many redundant words as possible
- make sure the conclusions are clear
- ensure it is consistent with the main paper
- avoid abbreviations unless they are widely accepted

Most journals also offer the ability to place a few keywords at the bottom of the abstract for indexing and search purposes. This is another place where you can use the keywords that you found for the title.

Introduction Section

Much like a good story, an introduction section provides all the background information and previously reported data in which your research nestles. You will be using your inverted pyramid template structure to flesh out the introduction section into a clear path leading to the reason why you are doing your research.

If you think about any good book or film that you have read or recently watched, the creators of the story start with a very broad statement about the scene and setting. In a film, you often have what they call an *establishing shot*, which provides an overview of the environment that the character is living in. Your introduction needs to do exactly the same thing.

The introduction section should be written using the simple present tense and any abbreviations or explanations of terms are included in this section. The main goal is to convey the basic information to the peer reviewers and readers without forcing them to also read previous publications. It additionally provides clues as to the results of the study.

I like to think of the introduction section in three parts:

1. information about the general topic with reference to current literature.
2. specific subject matter discussion and your problems discussed in context of this literature.
3. recommendations for solving the problems (that is, the methods proposed and used in the paper) and an indication of the purpose of your paper.

It is important not to give away any of the conclusions in this introduction section. This can act like a teaser to keep the person reading your paper. And as my PhD supervisor always used to tell me: 'Do not put the cart before the horse'.

To understand the sections in more detail, let's take a look at them now.

General topic information

In this first paragraph, the topic should be introduced using current literature as if the reader is completely ignorant of the field of research. You can think of this part as building up a rapport and easing them into your research story slowly.

Make sure you are presenting the most up-to-date background information you can.

Specific subject matter

After you have presented the general topic information it is time to delve into the main topic of your manuscript.

You should present the literature that is directly related to the main topic of your peer-reviewed paper and then home in on the problem that your paper addresses.

Wherever possible, you should reduce your problem down to one major and most pressing issue. In some fields this can be difficult, but I urge you to reduce the number of issues that your paper addresses to as small a number as possible.

As we discussed above, you should be able to state your problem in one or two sentences. If there are too many problems stated in an introduction it can easily become confusing and too complex for a peer reviewer or reader to follow.

If you find that you are unable to reduce the number of problems to one major one, you may have to split up the information into multiple papers. That will please your supervisor as they will get to publish two articles for the price of one, although, it does mean more work for you.

Indication of purpose

Lastly, the final paragraphs of the introduction section should include a proposed solution to the problem highlighted in the previous section.

It is important to conclude the final sentence with the main novel aspect of your paper. For example, is it new, novel, interesting, contradictory?

This will ensure that the reader and reviewer know exactly why this contributes to your field and why they should continue reading the paper.

Methods/Experimental

The methods and experimental section of your paper are simply the list of methods or instruments that you have used to perform your research.

This section is very important if people are going to reproduce exactly what you have done. The majority of papers don't do this enough justice – particularly in the sciences where they leave out lots of important experimental information, leading to the reproducibility crisis.

This is the first section that I populate because it is easy to write, can be copied and pasted from other articles or your thesis, and starts the momentum of writing in a very obvious way by adding hundreds of words with very little effort. I actually quite like opening up a document that already has a few hundred words in it because it feels much less like I am starting from zero – a little mind game that seems to work for me, at least.

The first time you produce a methods and experimental section, I recommend that you keep a separate Word document populated with the different methods that you have used throughout your research so that you can easily copy and paste into your thesis and future publications.

Remember to include all the information required to reproduce your work and if in doubt, use a paper from your references to structure and format the method section.

This is a very boring and administrative part of the paper but one of the most important aspects in sharing how you did your research, providing the foundation for why your results should be trusted.

Results and Discussion

This is my favourite part of writing.

When I get to this stage, I know that the story has already been fleshed out and now it's a case of populating the spaces between figures with explanations and discussion.

In some fields, the results are presented before the discussion and in other fields they are mixed. No matter how your field approaches the results and discussion section, the basic principles remain the same.

If you're not sure exactly how to approach this for your research area, I recommend selecting a few good papers from your field (especially some published in your target journal) and take note of how they present the data.

Read them carefully and note how the results section is structured. Pay attention to the type and amount of information that is provided and how the findings are organised. Make a note of the figures that stand out to you and try to emulate the same style in your own figures. Understand what works well in your selected papers to effectively convey their findings, and then apply that to your own writing.

The results section

If you are talking about results, you need to present the data in the most logical order possible. It's important that you use graphs and tables to provide a visual representation of what you are talking about.

In the first instance of referencing a graph or table you should simply state what the results show, without trying to interpret them.

You should also place the figure or table after the first paragraph in which it is first referenced.

The results section should be kept free of interpretation. Some other common errors are:

- including irrelevant information – if the information does not relate directly to the main problem the paper solves, leave it out.
- repeating background information or methods – in this section be careful not to simply repeat background information or the methods.
- including raw data – the data that you present in your results section should be presented so that they support your findings. There is no need to present every single number and calculation that you have done. A summary of the results is fine. If you want to present raw data, you can do this in the supplementary materials section of the paper. You can use a service like Figshare to host all of your supplementary data.

The discussion section

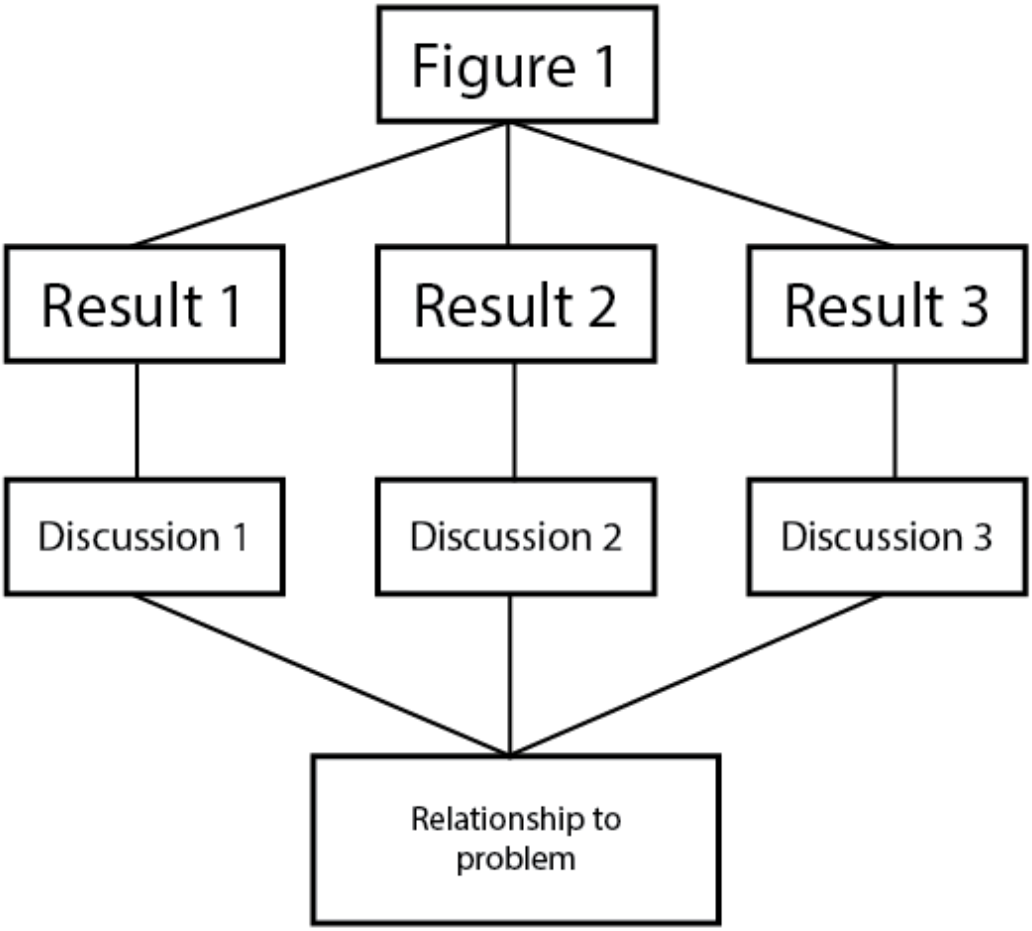
In some fields, the discussion is carefully interwoven with the results and visual components whilst in others it is a separate section altogether. If the discussion is not in its own separate section, remember to present the results first, before you attempt to interpret their meaning.

For each figure and data that you present, you should have a corresponding discussion paragraph and be able to link that back to your problem or to the literature quoted in the introduction.

When you are discussing your results, you should provide a logical interpretation of what those results mean.

One of my big issues when I was discussing my results was stepping past the logical conclusions of the data, and including statements that the data simply did not back up. I got better at this over time, but my inner marketer wanted to impress the reader.

A peer-reviewed paper discussion is not there to impress but simply to present the logical conclusions from your data.



Conclusions

The concluding remarks of a paper bring together the results, discussion, and problem in one easy to understand package.

Often this is the second most read part of the paper, as the reader wants to know more but isn't interested in the full details presented in the results and discussion.

The first part of the conclusion section is summing up the problem that you are solving. You should avoid phrasing it exactly how it was described in the introduction section. Ideally, you will be able to find a new way of circling back to the problem.

The second part of the conclusion section is designed to summarise how the research addressed the specific problem, and presents the arguments or empirical evidence that provide an answer or solution to that problem.

The third part is to discuss the outcomes of your paper, which means expressing the key takeaways and the practical or theoretical implications of what you have discovered. This can be described as answering the *So what* questions.

Finally, talking about further work is also an important component so that the readers and reviewers understand where the limits of your conclusions lie. This can be described as answering the *Now what* question.

Sum up the problem you have solved (don't repeat intro word for word)

Summarise how the research addressed the specific problem

Present the arguments or empirical evidence

Express the key takeaways and the practical or theoretical implications

Further work

Layman summary

This is something that not a lot of people do when they publish a paper, but I think it's very important.

A lay summary is a summary of the research that is used to explain complex ideas and technical and scientific terms to people who do not have a prior knowledge about the subject or research.

I like to think of the audience for this Layman summary as an educated 14-year-old.

Research funders are increasingly expecting universities to demonstrate the impact of their research on the public, and how they are meeting the needs of society, as well as the relevance of their research, in order to justify the large expenditure.

It's important because it explains your research to a larger audience, and it will help you promote your research (more to come in a later chapter). It will also help you answer simple questions from the general public (or your mum, dad, gran or grandad) with simple language.

Writing a good layman summary typically follows these simple rules:

- explain your research in 25 words and then use this as your first sentence.
- write how you speak – one of the most important aspects of this is that you write it down exactly how you would tell someone in person. This gets you away from that stuffy academic language that can be a barrier to some. If you wouldn't say it, don't write it.
- your problem should be repositioned as something that affects the average person. The more emotional and relatable the problem, the better. Why is it important to them?
- remove all jargon, scientific and technical terms, and acronyms. If you cannot avoid it, provide explanations.
- use short clear sentences of about 25 words or less.
- find someone who is not in your field and have them read over the Layman summary.

We will talk about how you can promote your research to a wider audience in the last section of this book. Learning to do this effectively and efficiently is a true superpower that can boost your career and opportunities exponentially.

Not many people are willing to invest the time to build the skills – but it'll be worth it.

Graphical abstract

As peer-reviewed papers are becoming more digital, journals are asking for graphical abstracts to support the peer-reviewed paper.

It seems like the job of an academic is becoming even more diverse. There is now the expectation that they should be able to produce beautifully designed infographics and graphical abstracts to attract a wider readership for their papers.

Luckily, there are some great tools that allow you to create a beautiful graphical abstract without needing to be a designer. These include:

- Mind the graph (https://mindthegraph.com) – a new tool for creating awesome graphical abstracts.
- Biorender (https://biorender.com) – can be used for abstracts as well as for figures.

If you fancy yourself as a bit of a designer and you don't want to use templated methods or software that fully designs the graphical abstract for you, there is an option to use other online software such as Coral Draw, Inkscape or Adobe Illustrator.

Alternatively, you can escape having to design a graphical abstract and use a simple flow diagram to describe a process. You can even design a graphical abstract in PowerPoint and then export the slide as a JPEG.

No matter what you decide to use, you must follow these simple steps to make it an attractive and informative graphical abstract:

- conceptualise
- sketch
- design

In the conceptualisation phase, you just need to work out what exactly you want to show and what the main message of your graphical abstract is. It can be very easy to try to squeeze too much into your graphical abstract, and if you've done the research, it can be hard to distil it down to the main point.

The graphical abstract for your paper should have a clear start and end that draws the eye through the graphical abstract. It should not contain any complicated diagrams that you have included in the paper itself. It should emphasise the novelty of your findings without having to rely on details from the literature. You should also not include any data. It needs to be visually expressive without the need for people to read or interpret graphs or tables.

The next step is to sketch out what you think the graphical abstract should look like. Simply use the graphical abstract aspect ratio of the journal that you are targeting and sketch out a couple of options.

Play about with a few styles and designs before settling on your favourite features of each and before combining them into your optimal graphical abstract.

Finally, you should take your sketch and reproduce it in your editing software of choice. Make sure you use all the technical design requirements for a graphical abstract. This typically includes:

- the size – how many pixels and dots per inch
- the font – size of the font, typically Arial between 12 and 16 points
- preferred format – JPEG, TIFF, PDF
- content recommendations – colours and layouts.

If you are in doubt, and your budget allows, I highly recommend making contact with a science communicator or company that specialises in the visual representation of science.

Tools

- Mind the graph (https://mindthegraph.com) – a new tool for creating awesome graphical abstracts.
- Overleaf (https://www.overleaf.com) – if you are writing your paper in LaTex, this provides an easy-to-use online collaborative editor access to your paper.
- iThenticate (https://www.turnitin.com/products/ithenticate) – this is the best academic plagiarism checker.
- Figshare (https://figshare.com) – researchers can self-deposit research data with light documentation. Each document is given a digital object identifier, allowing the credit to be attributed to their authors.

Editing

There is something that every single PhD student, Master student, and writer of peer-reviewed literature has in common – they simply do not get feedback on their writing soon enough.

Research attracts perfectionists. The need to be seen as clever by ourselves or others simply holds us back from getting feedback on our work early on.

I used to be a victim of this too. I would read the same paragraph over and over, trying to make it perfect. No matter what I did, I always missed errors, and the paper would come back with a load of corrections anyway.

The trick here is to be able to set your ego and your perfectionism aside and allow yourself to receive criticism as early as possible. Remember that people are not criticising you, they simply want the paper to be the best it can be. After all, their name is on it too.

Getting feedback

You can choose to get feedback on individual sections or hand over an entire first draft of a peer-reviewed paper for feedback. My recommendation is that if you are not able to get a full draft to someone, that you drip feed them the sections as they are drafted.

Typically, the first draft of every section should go through your primary supervisor. After it has been looked at by them, you can then approach the collaborators – whose names appear on the paper – for secondary opinions.

At one point, my post doc position had five supervisors. This was a nightmare to manage, and I noticed that they started changing each other's words. When it gets to this stage, you know that the paper is ready for submission and that they are making changes based on personal preference rather than convention.

First draft feedback

When you hand your first draft to your supervisor, you need to make sure they are aware that it is a first draft. You should ask them to not only look at the details of the paper but to also provide feedback on the story and overall structure.

This first draft feedback can be brutal, and I used not to be able to see my draft page for the amount of red that was on it. Instead of taking this as a comment on my ability to write, I used it as a way to learn. If I was unsure about why a particular change was made, I would make a point of seeking out my supervisor to ask.

Academic writing is very clinical and technical, and it is a skill that needs to be built, like any other. Dealing with criticism is incredibly difficult and, as PhD candidates and early career researchers, it can be hard to hear.

Dealing with criticism

Nobody enjoys being criticised even when we call it *constructive*. In academia, everyone has an opinion, and it is our job to be critical of almost everything. Unfortunately, this can sometimes come across as unfriendly and hurtful.

No matter what others say about academics, they are only human. Pride and ego tend to get in the way from time to time, and may even lead to stubbornness.

There is no doubt, however, that to get better at writing you need to positively handle criticism. Here are the top ways that I have been able to overcome the negative feelings associated with having someone criticise my work.

1. **Stop the first reaction and don't become defensive** – our first instinct is that we should defend ourselves and our writing. The first step in accepting criticism is to avoid lashing out emotionally and let that first reaction die away.
2. **Tell yourself the feedback is a good thing** – after taking a nice big inward breath, remember that criticism is your opportunity to grow as a person and as an academic.
3. **Ask for clarification** – if you are unsure about a particular criticism, you should ask for clarification. This allows you to further deepen your understanding of where you went wrong. It also helps improve your relationship, as the person providing the feedback will see you as someone who is coachable and as someone who values their opinion.
4. **Thank them for their feedback** – being in academia is a relatively thankless job and you'll be amazed at how far a simple thank-you will go with your superiors and collaborators. Expressing your gratitude makes you capable of being able to tackle your shortcomings head on, and to take control of the situation.
5. **Do not take the criticism personally** – so many times I've sat down with my supervisors when they have been particularly grumpy or upset. Little did I know that there was typically something going on in the background that I wasn't privy to. Even if the feedback seems particularly harsh, avoid reacting and simply view it as part of the process and not a personal attack.

These simple steps have enabled me to form positive professional relationships with all of my supervisors, and they have made me a better academic. I know they can work wonders for your relationships and for your sense of growth as well.

Working efficiently with your supervisor/collaborators

Working efficiently through the editing process with a range of collaborators and supervisors can be tricky. One of my research projects ended up with a paper with over 11 authors. This meant that each individual author needed to have their say on the paper, provide feedback and suggestions, and approve the final submissions and journal selections.

Even if you only have one other name on your paper, you are not immune to having delays. I have heard of so many supervisors whose timetable and availability mean that paper drafts and thesis drafts have been on their desks for months. I've never understood this because it is in their best interests to get published as well.

In order to stop this happening, you need to communicate to your supervisor or collaborator exactly what is required from them, and have them tell you when to expect the corrections back.

I also say to supervisors and collaborators that if they do not provide feedback in a reasonable amount of time, I will seek feedback from other scientists to help speed up the submission process. Normally this little threat activates their ego sufficiently to respond in a timely manner.

In the past, I would typically send my draft to one supervisor at a time but with new collaborative software, I would now favour using collaborative writing software such as Google Drive, so that many people can work on the document at the same time. This would greatly speed up the process and also would allow you to keep a single master document up to date from many editors working on the same paper simultaneously.

When do you know editing is over?

Editing is a process that could go on forever. I found that my supervisors would be changing their previous amendment suggestions when I gave it to them for a third or fourth edit. This is often a sure sign that the paper needs to be submitted.

Ultimately, it is up to you to decide that it is time to submit your paper. This is typically a little bit after you become fed up with opening the file to work on it.

Getting the paper to peer review as soon as possible – even if it is not perfect – is the name of the game in succeeding in academia. As long as there are no obvious errors and the grammar and logic are able to be followed, you can submit it for peer review. After all, the peer reviewers will tell you exactly what is wrong with the paper in order for you to improve it. They will find gaps in your knowledge or arguments that will make your paper better.

I often felt that if I was submitting a perfect paper, the peer reviewers wouldn't have anything to comment on and that wouldn't give me an opportunity to improve my science or manuscript.

Tools

Writing tools

- Writefull (https://www.writefull.com) – using language models trained on millions of journal articles, Writefull corrects grammar, wording, sentence structure, and more, and is aimed specifically at academic writing.
- Penelope.ai (https://www.penelope.ai) – a way to check academic manuscripts easily.

Formatting tools

Typset.io (https://typeset.io) – formats articles for submission to over 100,000+ journals.

Submission to journal

This was one of the hardest decisions that I had to make as an academic. Everyone wants their paper in a high impact journal, but the chances of succeeding in this are often very low.

When I was an early career researcher, someone once told me that if I was able to publish in *Nature*, or *Science*, or in another high impact journal, it would *make my career*. I never really understood the importance of publishing in high impact factor journals until much later in my academic career.

There is no doubt that a high proportion of luck is associated with getting your peer-reviewed article accepted. You need to target the right editor, with the right paper, who then passes it onto peer reviewers who understand the significance of your work (and are not having a tough day). Then, you must make all the changes from the reviewers and resubmit to the editor.

This process requires equal parts of work and luck.

You should always aim for the highest impact factor journal that you can see your paper getting into. If you are lucky enough with your first submission to publish in a high-ranking journal, it will open opportunities for further publishing in that journal.

If, like most of us, your paper gets rejected by the editor or the peer reviewers, you simply reformat the paper, make the amendments as suggested by the peer reviewers, and resubmit to a different journal. You keep doing this until your journal finds its home.

Selecting the right journal

There are a couple of approaches when selecting a journal.

The first method is to simply apply to the journal that most of your references are published in. This method provides an easy way of evaluating which are the best journals for your work. If you are referencing mainly from one, it may make sense to publish in that journal.

The other method is more of a game.

One of my previous supervisors would simply choose the highest impact factor journal possible and continue to submit in lower impact factor journals when it was rejected from higher ones.

I couldn't help but be impressed with his optimism, even though I thought it was a little misplaced at the time. He told me that if your papers are not being rejected more than 80% of the time, you are not aiming high enough.

This approach is all well and good if you are not in any rush to publish your paper and can afford to wait for a couple years for it to bounce around until a journal accepts it. Besides which, it is quite time-consuming to format and resubmit to different journals. It would often take me an entire afternoon to reformat a paper and submit all the appropriate accompanying paperwork.

Choosing a trusted journal

Once you are happy that the journal you have selected matches with the content you want to publish, and that the article you have a draft for matches the length guidelines, you should ensure that the journal you are publishing with will actually contribute to your career.

You need to select a journal that is indexed in a database.

If you don't select a journal that is indexed in the most popular databases, all your hard work will go to waste.

Some databases to check are:

- Web of Science – they contain journals spanning the humanities, social sciences, and STEM fields. Use the search box to check for your target journal.
- Scopus – typically for journals in the social sciences and STEM fields.
- PubMed – this database contains life sciences, clinical, biomedical, and other health journals.
- SciFinder – for journals in chemistry and related fields
- JSTOR – this database contains journals in the arts, humanities, sciences and social sciences.

Other important resources worth checking can be found at Think Check Submit or you can use this PDF Journal Evaluation tool that has been developed by Loyola Marymount University and is available under the Creative Commons Attribution.

Journal evaluation tool:

https://digitalcommons.lmu.edu/cgi/viewcontent.cgi?referer=&httpsredir=1&article=1041&context=librarian_pubs

You can also make friends with your friendly university librarian who will be able to help you choose the best journal for your work. In my experience, these librarians are a greatly underutilised resource for researchers for a variety of reasons.

Ultimately, you need to make sure that the effort you go to in collecting data and publishing it counts towards your career.

You do have to be wary, however.

Not all journals have your best interests at heart. Even though the whole industry really is about making a load of money on the back of academics and free labour (academics typically peer review papers for free), there are some predatory journals that provide misleading information to academics and use aggressive practices to solicit submissions. You should avoid these.

Avoiding predatory journals

Once you submit your first paper, or your email address goes onto your university website, you will likely receive emails from predatory journals. These are the spam of the academic world, and can cause a significant amount of noise in your email inbox.

These journals prioritise making money over publishing solid evidence or results and often charge a high fee for publishing in their paper. They adopt the principal of ready acceptance, which rarely includes peer review or any real check of the paper's results and conclusions before publishing.

Luckily, if you scratch the surface a little, predatory journals are very easy to spot. Signs that a journal might be predatory include:

- The journal is ***not*** listed in the Directory of Open Access Journals (DOAJ).
- The journal is ***not*** listed in Ulrichs (Tufts login required), which is an authoritative source on publisher information, including Open Access titles.
- The publisher is ***not*** a member of the Open Access Scholarly Publishers Association (OASPA).
- The journal is ***not*** widely available within major databases.

Some of the red flags that will stand out include:

- you don't recognise the members of the editorial board from within your field, and it is hard to find their contact information
- the journal doesn't look professional or polished
- the journal does not report an impact factor or provide document object identifiers (DOIs) for individual articles
- the journal is not affiliated with any organisation or university you have heard of previously
- the author processing fees are hard to find or are unusually excessive.

Sometimes, in the rush to get published in as high an impact factor journal as possible, people fall victim to predatory journals. However, simply checking the lists and features above, will provide you with the best weapon against submitting the paper you have worked hard on to a junk journal.

That said, not all journals that charge extortionate fees are predatory journals. You can also pay a fee to have your paper appear in an open-source journal.

Paid or open-source journal?

In the not-so-distant past, the only way people were able to get a copy of your paper was by subscribing to the journal that you published in. They would go to the library, sift through all the papers, and find yours.

I actually did this as part of my undergraduate degree – I can't believe I am that old!

However, since the Internet has democratised information, scientists and researchers no longer require access to the latest hard copy in order to keep in touch with the most recent developments in their field.

Research today is disseminated through many avenues – including social media, blogs, Twitter, and websites – and can also be freely distributed to anyone with internet in open access (OA) journals.

Previous business models for academic journals charged the reader a fee for subscribing to the journal or for one-time access to a paper. Nowadays, researchers producing a paper can decide to pay a fee to make their paper freely available.

Even though this may seem like a no-brainer for the majority of researchers, many struggle with the decision. This is because there are four main factors to consider when making the decision surrounding whether or not to publish in a paid or in an open-source journal. These are: visibility, cost, prestige, and speed of peer review and publishing.

Visibility

If you publish your peer-reviewed paper in an open access journal, it is likely that more people will see it and read it. That is simply because there are more people who will be able to access it.

One study showed that full text downloads of open access papers were 89% higher, and PDF downloads were 42% higher, and unique visitors were up 23% over those with a subscription access.

Think about when you look for a paper — it's unlikely that you'll pay for access for individual papers. With controversial tools such as SciHub, there are free ways to access expensive journal articles.

Quite often, people use SciHub to simply check to see if the paper is relevant to their work before deciding to get a copy from their library. You can also contact the authors of the paper directly, who will be authorised to give out free copies of their paper in the majority of cases.

Cost

Both subscription-based and open access journals charge a small fee at the time of submission to cover the editorial and peer review related costs. Traditional journals typically charge somewhere between $100 to $250 each, and can also charge per colour figure as well.

Open access journals typically have a flat rate, which can range anywhere from $8 to as much as $5000. This high cost sometimes makes it prohibitively expensive for authors who do not have a large budget for open access publishing.

Some journals offer waivers on publication fees. If you contact the journal editors directly, it may result in a full or partial waiver.

Universities spend a huge amount on academic subscriptions, as much as $40,000 for full online access to journal articles. To save costs, my universities would often cancel subscriptions to journals and encourage submission to open access journals.

Prestige

Prestige is an odd thing in academia.

People want to get into as high an impact factor journal as possible, and often these are not the open access journals.

Open access journals are typically not as well-known as some of the larger, more well-established journals, which can cause hesitancy among researchers.

Many academics still place high importance on well-known journals, because publications in these journals can often increase their chances of being promoted, of gaining tenure, and in obtaining funding for grant proposals.

Speed

Getting your paper published quickly is very important to academics, especially if you are an early career researcher. You need to increase your peer-reviewed publication output as fast as possible so that you can keep up with the publish-or-perish race with other researchers.

Many open access journals advertise a more rapid publication process. If speed is an important factor in your decision and you have the money to pay for open access journals, it may be the best option for your career in the long run.

There is no doubt that open access journals are changing the landscape of the publishing industry and will continue to grow in popularity among researchers. More traditional journals are also opening up their business models to include a hybrid approach, which allows for them to be both paid and open access journals.

Once you have decided what sort of journal you want to publish in, you should format your paper for a journal submission.

Formatting for a journal submission

Formatting a peer-reviewed paper for submission is a massive pain in the arse.

When I was submitting my papers, I would have to download a Microsoft Word template provided by the journal and then copy and paste all the information into the supplied template.

If you have worked with MS Word templates, you will understand that it is difficult to get all the elements in your paper to line up and to interact with other elements without looking rubbish. This regularly resulted in my launching a variety of fun swear words at the computer.

There are now ways to format your journal article easily, and services like Typeset.io allow you to write and submit research papers in over 100,000 verified journal formats. It is as simple as uploading your Microsoft Word files and selecting the template you would like to use.

Submission

Pushing the submit button on your peer-reviewed paper feels like a massive weight has been lifted from your shoulders, or at least it did for me.

You can use a service like https://www.penelope.ai to check your manuscript before submission to stop any rejections based on silly mistakes. This is also a good time for you to check that you have satisfied all the requirements of the journal and double-check exactly what the process is after submission.

Submitting your paper is relatively simple and is often performed through the publisher's online gateway. You may need to enter everyone's author details, upload the paper, agree to some conditions, sign a form and upload it, pay some money, and generally you will supply a cover letter as well. This cover letter is very important to ensure that the paper gets through the first gatekeeper – the journal editor.

What happens after submission

After you push *submit,* the journal editor will receive your paper and they will be, as I said, the first gatekeeper that you need to get past.

As long as you pass the editor's first glance, they will send off your peer-reviewed paper for evaluation by at least two qualified reviewers – and I have had up to three reviewers for a single paper.

The editor invites reviewers who are experts in your subject matter to evaluate the article and provide feedback. After this, the reviewers comment on a variety of points, such as whether or not the study is well-designed, if the results are not novel or interesting enough, and the reviewers can also help you hone key points and identify or resolve errors in the paper as well as help you to generate new ideas.

The reviewers' feedback informs the editor's decision on whether or not to accept the paper into the journal. They are looking for:

- Scope: Is the article appropriate for this publication?
- Novelty: Is this original material distinct from previous publications?
- Validity: Is the study well designed and executed?
- Data: Are the data reported, analysed, and interpreted correctly?
- Clarity: Are the ideas expressed clearly, concisely, and logically?
- Compliance: Are all ethical and journal requirements met?
- Advancement: Is this a significant contribution to the field?

The good thing is that you will have the opportunity to provide a response to the editor to argue back to one of the reviewers, which is always a lot of fun.

Typically, you do not know the reviewers' names. This can be either single blind (where the names of the reviewers are not shared with the author, but the reviewers are aware of the author) or double-blind (when neither the author or the reviewers are aware of each other's identity).

Both of these types of review are designed to provide an honest and impartial evaluation of the article. Most publications I have published in have used the single blind review format.

The process of reviewing your article can take a few weeks. When the reviewers' comments are all in, you will get an email allowing you to view their opinions.

Likely outcomes

After the peer review process, the editor will consider feedback from the reviewers and then make a decision about the article. The decision will typically be delivered via email and the three basic types of decisions are: accept, revise, and reject.

Accept

If you receive the decision to accept your paper, you have just been blessed from on high.

After you receive the accept decision, you will be asked to complete additional steps. For example, you will be asked to provide final high-quality figures, and to sign your publishing agreement.

You will also be asked to review a final draft before it is published in the journal. You may have to pay fees and jump through some other administrative hoops.

In my experience, perhaps because I'm a poor writer, or perhaps because scientists literally can't stop themselves providing corrections, I have never received an outright accepted article.

The most common decision I have received is to revise and resubmit.

Revise

Asking for a revision of your paper is the most common type of decision. The peer reviewers have likely identified some changes or errors with your work that they want you to address.

The scope of the changes can be very small – like missing middle initials or references – all the way up to major corrections and rewriting of sections.

The decision letter provided to you by the editor will likely include suggestions on how to improve the article. It is common to provide a response to this letter and address each revision point-by-point. That is as easy as copying and pasting the revision and then replying to that suggestion directly underneath it, telling them exactly what you have changed in the paper.

Then, you simply resubmit within the timeframe that the journal gives you (although you can always ask for an extension) and it will either go to the editor for reviewing or, on the request of the reviewer, it can go back to them for a final check.

As you may expect, this part of the process and the revisions that the reviewers can ask for can also benefit them. One of the most common things that reviewers do is ask you to cite many of their papers, thereby increasing their H-index.

I have known of peer reviewers to ask for up to 20 extra references – all of them theirs. No-one, as far as I know, ever questions this and will very likely just include the references in order to appease the peer reviewer. Is this ethical? That is up for debate. But it is a reality of what happens during the peer review process.

Of course, it is all about playing the game and this is a part where the reviewer can directly influence their H-index by asking for further citations, so you really can't blame them for giving it a go.

Reject

If your article is rejected, the decision letter will explain why.

This isn't necessarily a reflection on the quality of the work but could be a reflection on the fit with the journal, or the fact that it simply did not get past the editor's desk to peer review.

Quite often, your rejection letter will provide suggestions for improving your article before you submit it to another publication.

Even though a rejection is never a good day, it is a very normal part of the peer review process, and you should approach it as part of learning how to become a better academic.

Remember to celebrate the acceptance of a paper

Academia is a cold harsh environment and sometimes it is easy to forget to celebrate the small and important wins.

I remember that when I first published a paper I was so excited, I ran into my supervisor's office to tell him, to which he responded, 'Excellent, when's the next one coming?' I had never felt so quickly deflated.

Just a little reminder here, to take moments – even if they are not supported by your superiors – to celebrate the acceptance of the paper. Each one is a little milestone in your career and, with constant and consistent effort, they can add up to something magical and much bigger than the sum of its parts.

Tools

SciRev (https://scirev.org) — this is a platform for scientists to share their experience with the scientific review process, allowing them to select an efficient journal for submission of their manuscript.

Communicating the results of your paper

Once your peer-reviewed paper has found a home in a journal, your job isn't over.

Too many academics forget that in today's academic roles it is also their job to promote their work and their papers. It is the most overlooked aspect of publishing a paper, simply because supervisors never had to promote their papers, but that has all changed.

I genuinely believe that communicating the results of your paper is an academic superpower that far too few people are utilising to boost their careers.

The ultimate academic superpower

In years gone by, an academic's job would be to publish a paper and then simply to move on to the next. In today's hyper-connected and internet-driven world, we need to be the drivers of our own promotion.

The reason promoting your work is important is that it can result in a number of beneficial outcomes for you, and for your institution.

For you, it can position you as an expert in your field. It can increase your authoritativeness when people are searching for you and your research online. Promoting your own work and taking the initiative to create multimedia and resources around your papers also positions you as an up-and-coming researcher in the eyes of the university. The positive news is that it doesn't really take that long, and even if you do just a little promotion, it is very easy to stand out. I genuinely believe that the reason I was able to survive in academia for as long as I did was that I was capable of producing interesting talks. This led to lots of invitations to present at invitation-only symposia, popular science articles, and passable infographics. These occasions also benefit the institution and university that you are currently working in.

Universities must constantly put out feel-good stories in order to attract students and other researchers to the university. By helping them identify and communicate interesting research stories you will get the reputation as someone who should be engaged if they need a talking head or if they need an expert to speak on a particular subject. Too many academics are completely unfriendly towards the media and marketing teams, whereas if you are willing, they will jump at the chance to work with you to promote your research.

Why people don't want to promote their work

There are a variety of reasons why people don't want to promote their work: they may not want to sensationalise their research, they may have no interest in extroverted communication activities like public speaking or creating a video, they may have no interest in learning design skills, or they are just unaware of the amazing benefits that exist outside their comfort zone.

Sensationalised science

I have been on both sides of the science communication fence. I was a researcher at a number of universities, where I would always cringe when the marketing team put a spin on research.

In 2017 I left research to pursue a science communication career. This short-lived career showed me that it was important to include an emotional hook to research in order to get people to listen and read further into the science.

I have published many articles on *Australia Science Channel, Cosmos Magazine, Australasian Science, Australasian Quarterly*, and in my own blog. I certainly found that including an emotional hook in the title and using power words were the key to getting people to click through to the article.

My views on the evils of university marketing teams have softened since being on the other side of the fence. Their key performance indicators are typically getting column space in major publications and newspapers. And they are generally struggling to stand out above all the noise of the 24-hour news cycle.

Anything you can do to help them means that you will be seen as an up-and-coming researcher and, with the right amount of relationship building, they can help build your profile as a scientist or researcher.

Lack of skills

When I speak to researchers about promoting their work, I am often faced with the rebuttal that they lack the video editing, graphic design, or writing skills required to promote their research effectively.

There is a wide range of online services and software options that can now take away the majority of the design process for you.

Alternative metrics

With the world producing approximately 3 million articles per year, sifting through the relevant information and attracting attention to your research becomes harder and harder.

Until only very recently, the influence of a published academic and peer-reviewed article would be measured by the number of citations it can accumulate over time. This is a very slow process, resulting in a long wait before the importance of an article is truly recognised by others.

The views of the article — something that can now be tracked online — is another very important way of measuring the importance and impact of a peer-reviewed paper, but once again, they can also accumulate very slowly.

Given the amount of innovation happening in the space, it was only a matter of time until a company decided to track the true impact of the paper by tracking digital and online attention. Arguably, the most famous and well-known of these companies is Altmetric.

Altmetric is a company that measures the real-time reach and influence of an academic article. The company scores the digital attention an article receives from a huge array of online sources. This includes social media, Wikipedia, blogs, mainstream news articles, and public policy documents.

The references made in each of these outputs are traced back to the unique identifier code and the Altmetric algorithm produces a weighted score to reflect the relative reach of each source. For example, blog articles are weighted lower than mainstream news reports.

This allows the attention of an individual article to be measured from the moment the article is available online. Altmetric scores given to peer-reviewed papers allow readers to quickly filter through scientific literature and look for the high impact science that has been published by the amount of online interest it is able to attract.

Each paper is given an Altmetric donut that illustrates the number of different channels the paper has been promoted in, and each channel where the work was mentioned has a different coloured stripe. The Altmetric score is reported as a number in the middle of the donut.

The popularity and rise of Altmetric indicates to me that we will see a significant additional focus on the impact that a paper is able to generate in the general population. Interestingly, of all the papers Altmetric ranks, it is generally papers related to our lowest human basic instincts, such as eating, reproducing and survival, that capture the highest attention from the general public. It's very lucky for you if you find yourself in this research category.

It’s not often that we are able to boost our own metrics directly. It is important you become comfortable promoting your research through a variety of different platforms, which might be social media, your own website or blog, using the university’s marketing team, or anything else that allows you to boost your own Altmetric numbers that you can then use to further your career.

There is a wide variety of different ways you can communicate your research, and you can choose one that suits your personality or comfort zone:

Enjoy writing – write an article for the conversation.

Like talking – get yourself on a science podcast or community radio station.

Like being the centre of attention – produce a video of you talking about your work, and edit it together with a talking head, and add in some B-roll or supplemental footage.

Does it all seem too hard? – Reach out to your university marketing team and get them to help you craft the perfect promotional material for your research.

Here are some awesome ways that I have personally used to promote research, whether my own or others.

Options for communication

The options for promoting your own work and increasing the reach of your research are wide and varied. You can choose to write an article to be included in a scientific publication such as *Cosmos Magazine, New Scientist*, or (very popular with universities) *The Conversation*. You can also choose to produce a short video or animation that highlights the key points of your research and the significance of it for the person watching.

Also, you can reach out to various podcasts and radio shows to publicise your work (I often spoke on a community radio show).

Often, you will work alongside the producer or editor of the communication channel to perfect your communication piece for their audience. There are many high-quality publications and science communication publishing companies that are always looking for high quality work to report on.

If you are able to show the editor or producer that you are interested in communicating your work and you can help them with the most annoying part – the content production – it is highly likely they will be interested in publishing your work.

No matter what publication channel you choose to use, make sure it is something you are interested in learning about and that you enjoy the process of creating the content.

Here are all the mechanisms you can use to promote your research to increase its impact, and to simultaneously improve your academic career.

Writing

Over the last few years, *The Conversation* has become a popular place for researchers to communicate their research findings and boost their impact. It offers a unique combination of academics and journalists working together. They can turn knowledge and insights into easy-to-read articles and make them accessible to a wide variety of demographics.

If *The Conversation* is not the right outlet for you, you can also reach out to editors in popular science magazines, trade journals, online science blogs and news websites to get your science into a popular science format.

Because writing a peer reviewed paper is incredibly technical and dense, it can be hard to swap over to this conversational and informal way of writing about the same results. This is a skill you can learn and it is easy to follow a few simple rules to tease out the main points of your paper and make them interesting to a general audience.

Try to simplify and summarise your article using these questions and prompts:

- What are the main implications of your research? Go beyond simply stating what you found and try to extrapolate what it means for the average person reading your article.
- How do the findings of your research impact the person reading the article?
- If you had to tell someone in one sentence what you had done, what would that sentence say?
- What is the most compelling fact or number you can extract from your research?
- What did you actually do in order to get your results? Was it in a lab, or did you look over literature, or did you perform a survey? You need to give people an idea of what sort of activities led to your conclusions.
- What's next for your research? Talk about limitations and any exciting new directions you think your research may open up for future researchers.
- Grab quotes. Quotations from the researchers (your collaborators) are incredibly powerful when included in your popular science or research article. People love hearing directly from the scientists involved.

As a science communicator, I would often ask the lead researchers these questions, to tease out the most important and significant findings — you may also find them useful.

- What do you personally find most surprising or exciting or important about your work?
- What specific directions do you think your research might or should go from here? What obstacles do you foresee in future research or development?
- Are there any specific questions or criticisms you feel others might have about these findings?
- What specific potential applications might this research hold?
- How did you become interested in this idea to begin with?
- What difficulties did you run across in your research? How did you surmount those challenges to reach your current insights?
- Could you describe the research a bit — anecdotes about the field work, for instance. What did things look, sound, taste, smell and feel like?
- Is there anything else you would like to say? Are there any questions you would have liked to answer that I didn't ask you?
- Are there pictures, videos or audio associated with your research that you could provide me?
- Is there any research of yours that journalists have not reported on yet that might be interesting for a story?

Having a clear answer to each of these questions will allow you to reach out to an editor and provide them with what is known as a pitch.

Pitching editors is a skill and art form but you can easily create a template (based on the one below) to speed up the process. Be sure to communicate the most important aspects of the research in your pitch and importantly, why you should be the person to write this piece.

The plan of a pitch follows the following structure:

- headline – keep emotive and to about 10 words.
- introduction – keep your pitch nice and conversational at the start and talk about any contacts you have in common. Then, talk about why you reached out and why you think your paper is timely, interesting, or unreported.
- what's the story? One sentence of your big picture, one sentence for your problem, one sentence for discovery, and one sentence for your results without any details.
- reference to your paper – say who did the study and whether the study was published.
- method — what experimental details do they need to know to understand how you did your work?
- numbered results – keep this very brief. Sum up how the method led to the numbered results and your detailed conclusions.
- benefit applications – details of how the discovery delivers benefit, and include a quote from an independent expert or the lead author of the paper.
- include an ending that highlights how many words you think the article should be, your experience (as a scientist) and any other articles that you have written in similar publications.

Once you have their attention, you can start the conversation about publishing in their publication.

Notes on language and length

All popular science articles should be written in simple language and without technical jargon. This is the complete opposite to what you need to do if you are publishing in peer-reviewed journals. If you are forced to use technical expressions, make sure you explain them in simple terms as soon as they pop up.

One of the biggest differences my science writing mentor made to my writing was by telling me: *Write it how you say it*. I would often present her with the draft of a science article and then realise that I had overly complicated it. She would simply ask me to explain what I meant, and then she would say 'Write that!'

Keep your sentences short, with about 20 words or less. There is no hard and fast rule about this, but the rule of thumb is to make every sentence length as short as possible and keep sentences simple and straightforward.

Keep your paragraphs short – even single-sentence paragraphs are perfectly fine. I often find that the paragraphs I write for a popular science article are between one and three sentences in length. This makes it easier to read for an online audience who are primarily on their phone and are wanting to skim the article.

When I was writing for a number of publications such as *Science Alert, Cosmos Magazine,* and *Australia Science Channel,* my science article would be somewhere between 500 and 800 words long. Keeping it short means that you are likely to retain the majority of readers and it forces you to use each sentence for maximum impact and storytelling. Cutting out superfluous information and pointless side information keeps your story focussed and more engaging for the reader.

Almost all research articles use an impersonal tone, whereas popular science articles should be much more personable and friendly. To achieve this writing style, you can use the following tools:

Use personal pronouns such as *I* and *you*. Active voice makes writing brighter and more immediate, and is more informal and conversational in tone. And you can use contractions such as *can't* and *don't,* and run-on expressions to extend an idea: for example, *and so on*, and *et cetera*.

Video/animation

The world is becoming increasingly visual. Learning basic video editing skills and more advanced animation skills can really become a secret superpower that can significantly increase the reach and impact of your research.

Becoming comfortable speaking to a camera or journalist is a fantastic way to improve your public speaking, a skill that can allow you to significantly increase the reach of your work.

Most people shy away from the camera, but in my experience, learning to talk slowly and confidently with a journalist whilst being recorded, or for your own content, is a skill that will place you in high demand. As an example, I gained the reputation in my first post doc of being a good public speaker. This led to an invitation to speak at the university's *TEDx* conference, which then opened up access to other high-profile science communicators, and invitations to speak across Australia.

I have been invited to speak at Wiley's executive seminar, the Australian Medical Writers' Association conferences, and to participate in a load of different science communication panels, including the National Science Quiz hosted by famous Australian comedian, Charlie Pickering. All this was fun, and a little bit nerve racking.

If you want to produce your very own science videos, the investment in a tripod to hold your smart phone still as you talk is a wise move. Learning to edit with free programs such as iMovie, or paid programs such as Adobe Premier Pro, will allow you to quickly create companion content for social media and other online publications.

If you are not keen on being the face of your research, you might opt to produce a short animation. Animation is a whole other ball game and can take a load of practice to get right. However, simple animated text on video content can perform very well on social media, as long as it is kept under one minute and is interesting to watch.

Following a simple story structure (background, problem, and solution) will be the key to holding your audience throughout your entire animation.

You can produce simple animation with artificial-intelligence driven video generators such as:

- Synthesia
- Rephrase.ai
- Designs.ai
- Lumen5

They all take a little bit of getting used to in terms of the user interface but can be powerful tools to produce short videos to boost the impact of your paper.

Podcast/Radio

It seems that nearly everyone has a podcast these days. I started a podcast with a couple of research friends some years ago, called *Publish, Perish or Podcast*.

It is very likely that your university or someone you know is currently producing a podcast. If you are only promoting one research paper, you do not need to start your own podcast and you can simply ask to be a guest on an already established podcast.

I have also found great success in reaching out to community radio programs and asking if they have a dedicated news or science show where I can talk about my research. These radio stations often have a large listener base, and they are often desperate for content.

Tools

- Kudos (https://www.growkudos.com) — increase the impact of your research by producing a simple summary web page of your research
- Synthesia (https://www.synthesia.io) — a way to create professional artificial intelligence videos from text
- Rephrase.ai (https://www.rephrase.ai) — create studio quality videos by simply typing
- Designs.ai (https://designs.ai) — a way to create online videos and voice-overs with artificial intelligence.
- Lumen5 (https://lumen5.com) — a platform to easily make videos for social media

Repeat ad nauseum

You now know all the steps to writing a peer-reviewed article quickly.

By simply following this guide and using the tools I have highlighted, you will be able to increase the quantity of papers you publish throughout your PhD and your research career.

The main research game plan should be to work on a number of different articles at the same time and always be pushing them through each stage of the writing process. A particularly large project may be able to be split into a number of individual papers with a well-defined problem and thus easily boost your academic metrics.

Thank you!

Thank you for taking the time to read this ebook and learn what others never take the time to fully understand.

If you are finding your early academic career stressful, I want to extend an invitation to join my members-only community of PhD students and academics.

You can find more information about the community at academiainsider.com/community.

People are saying some awesome things about the support it provides to them!

> **I want to express my gratitude for the amazing group of people assembling on this platform! I've read through most of the posts/threads and have learned so much already, so thank you!**
>
> *— Community member*

I shall continue to publish videos and other content over on my YouTube channel and I want to wish you the best of luck in your Academic career!

YOU'VE GOT THIS!

Dr Andy Stapleton