A career in research

Tips for running your own research group

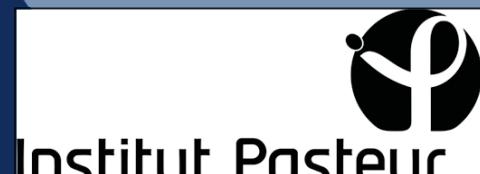**May 2018**

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Preface

This guide is intended to support senior postdocs and newly appointed group leaders as they switch from being a member of someone else's group to running their own. If you're at an earlier stage in your career, it will be useful in helping you decide whether being a researcher is right for you.

Doing research for a living is an exciting prospect: you have exceptional flexibility and independence, the great privilege of doing what you love, and the possibility of discovering things that no one knew before. Exciting as it is, the transition to becoming a fully-fledged independent academic may seem daunting at first.

Research is a worldwide enterprise, so you'll be working globally, not just within your own department or your own country. It requires you to think big, to think strategically, and to position yourself so that you can seize opportunities as they arise. You are entering an extremely demanding profession, and you're likely to hit a rough patch now and then. However, if you have the necessary passion and determination, it can be a highly rewarding journey. There is not a single' right way': the key is finding your own path.

This guide has been compiled as a joint effort by funders, with input from over 100 researchers and Wellcome interview panel members. Rather than a strict set of rules or a comprehensive handbook, it should be viewed as a collection of general tips and pointers to help you get started with your own group no matter where you're based or what you're working on.

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Introduction

Starting out as an independent researcher is an incredibly exciting stage in your career, so congratulations on having made it this far! The next few years are your opportunity to prove your worth; you need to think carefully about your research and the people you hire, and in choosing the external activities that will enhance your work.

You will probably have a limited period of time in which to prove yourself, so you'll be under some pressure. And the change from working for someone else to running your own group is probably the biggest career adjustment you'll ever have to make. You go from working as part of a close group, with a supervisor who is personally invested in your work, into relative isolation and having to build your own community. It's exciting, but can also feel alarming and a little lonely at first. It helps to remember that you'll soon have new colleagues you can bounce ideas off. Best of all, your future is in your hands, and that's something to relish.

There are several ingredients to a successful career:

- The quality of your research is absolutely fundamental. You could be the greatest teacher, project manager or networker in history, but if your research isn't excellent, you won't succeed.

- You must work out how you can be most effective in your new job, while maintaining a healthy work/life balance.

- Your group needs to be happy to be maximally productive, and the people you're training must understand what constitutes good research practice.

- You need to make your mark at your place of work, and build good relationships with the people there.

- You have to be closely engaged with the outside world – with other researchers, funding bodies and journals, and perhaps with patient groups, policy makers and the media, depending on your discipline.

In the next sections, we'll examine each of these factors, suggesting tips and resources you can access for help, and drawing on experiences of other researchers who've successfully navigated the maze. In the end, though, it's all about what works best for you. The only thing not recommended is to passively hope for the best: in research, as in life, you must make your own luck.

Section 1: Your research

Choosing your group's direction

You will probably be starting your new position with limited funding. The size of your budget will dictate the size of your operation, and this means you need to think hard about the research you want to do.

If you're coming from the relative security of a large group, you'll have to change your research strategy. You should still think big, work on the problems you're most interested in and pursue exciting ideas, but you have to adjust the way you work to your new reality.

Even if you've instigated a new line of research and have a head start, you'll be competing against big teams throughout the world, and perhaps against your former boss as well. Your challenge is to find a realistic starting point given your limited resources. Whatever it is, you must still address important questions, stay up to date with the latest technology, and do excellent science, so that you can begin to establish yourself at the leading edge of your field.

You'll also have to decide whether you'll be staying small or aiming to grow as fast as possible. This in turn will determine how much time you have to spend on doing the work yourself, or on writing grant applications to support more people. It will also determine the size of your team, and thus your

relationship with them – managing a team of three that you are with all day is very different from running a team of fifteen.

How do you decide what to do? You'll probably want to pursue the most exciting research project you can find, but you must plan carefully so you have a reliably productive project bubbling along, too; you need solid, competent output, to show you are establishing a promising programme of work. It's always worth also having a Plan B; aside from the chance that your big, risky project might not work, there are countless precedents where a second string project suddenly becomes more exciting due to unanticipated data.

Although you may want to choose a safe project to start with, you'll eventually have to work on something that's more exploratory and less established, or you might have difficulties making your mark and obtaining funding for your next career step.

Finally, you need to find your own niche. It's okay to continue working on your previous project for the first two or three years, but it's not a good long-term strategy, as you'll run the risk of being thought of as a clone of your former boss. Instead, find something that's related to what you've been doing and uses the skills you already have, but take it in a different direction. You might, for example, take the same question and apply it to another system, or take the techniques you've been using and apply

them to other questions. Just make sure that you're sufficiently different to stand out. Some thoughts on what to consider when choosing a scientific problem can be found [here](#).

Getting off the ground

Whichever route you take, don't underestimate the time it will take to establish your group. You will need to create a team, obtain funding, do excellent research and publish your findings. You should always think about your next steps, your long-term goals and whether you need to get additional experience, such as teaching, to help with the next stage.

Negotiating a good start up package

When you're offered the opportunity to run your own group, do not just accept the first contract you're offered without making sure that you have the best possible conditions to conduct your research. So give yourself a head start by negotiating the best startup package you can manage before you sign. If you don't, you'll find yourself lagging behind because the equipment and resources you need simply aren't there. The keys to any successful negotiation are preparation and benchmarking. You need to carefully identify your own requirements, and at the same time understand the position and possibilities of your prospective employer.

In terms of your research, it's a good idea to work backwards from what you want to do, to estimate the number of people and how much resource (equipment, running costs, access to facilities) you'll need to do it. Other considerations include setting limits for

"Spare a dollar for some lab consumables, buddy?"

teaching and administrative duties, having opportunities for future career prospects (eg support for applying for fellowships beyond the duration of the current contract), training opportunities for yourself and your staff, and salary levels.

You should also think about the logistics of moving yourself and perhaps your partner or family to a new place, which may be in a different country, and assess how much help you should request for this. Help with administrative issues such as visas, work permits and dealing with a foreign income tax system should be standard, as should a relocation package. Private health care for you and your family, help with housing costs, a job for your partner, and help with children's school or daycare fees, can all potentially be included in startup packages.

Plan as carefully and thoroughly as possible – and be specific. Compile a detailed spreadsheet or a checklist of all your requirements – directly research related and others – and estimate the desired, expected and minimum criteria for every item on that list. Identify your deal breakers: the factors which would make it impossible to conduct your research successfully, such as an excessive teaching load.

So how do you decide which requests are realistic? It's hard to find out what constitutes a normal startup package, as these vary widely between institutions and countries, and you may worry that you will appear greedy or naïve. You can counteract this by being well prepared and doing all you can to understand the current standards in the field. Ask advice from others who are also on the job market or have recently taken up positions in similar institutions. Talk to your boss and other senior colleagues about what your current department would consider reasonable. Use your network to contact someone who is able to provide detailed information. Again, the more specific you are, the more you'll benefit – and people are usually happy to help!

Even if you've done your homework well, it's likely that the initial offer will not quite match your expectations. Don't turn it down immediately, but ask for some time to reflect. If some factors fall into your deal-breaker category or are less than ideal, make sure to justify the needs for those specific requests and clarify the negative impact it would have on your research if those conditions weren't met.

In the end, it's in the interest of both parties – you and your future institution – for you to be able to do your research well.

These articles on how to decide what you need, how to negotiate to get it and how to manage your lab move may also be helpful.

Writing your first grant applications

While you should negotiate as much startup money as you can, you'll probably have to write grant applications immediately. The current financial situation means you should write several, to increase your chances of getting funded. Whether or not you've written grant applications as a lead investigator before, always get advice and feedback from trusted colleagues before submitting anything – you're far more likely to be considered for funding if your applications are well written, coherent and logically reasoned, and you need an experienced external eye to ensure this is the case.

Almost all institutions have a grants office that will provide invaluable help and advice, especially for preparing the non-research aspects (eg budgeting, animal licensing, documents concerning patient research) of the application. But be sure to contact them well in advance of the grant deadline – they work to different timescales from 'Please can I have this tomorrow?' Some institutions have an internal pre-selection for applying for certain grants and you need

to clarify this with your grants office. In addition to big, prestigious grants, it's worth applying for smaller pots of money to get projects going. Advice on how to write a good grant application can be found on a number of websites, such as [this one](#); advice on how not to write a good grant application can be found [here](#).

It takes time to write a good grant application, but the time you invest in thinking through the research ideas and plans is likely to assist your research in other ways. For example, it may spark ideas for new projects, stimulate contact with new collaborators or extend your knowledge of a subject that you can use to write about in papers or reviews. While you may not be able to accomplish any significant research when you're busy writing grant applications, you can keep your research activity going through collaborations.

You can also use your downtime productively by finding people who work in complementary areas of research in the same institution. This will allow you to make new connections, establish new collaborations and find new friends.

Section 2: Managing yourself

Be a good research citizen

A research career can be exhilarating but is at times a stressful business. To be successful you need to make the most of the rather unusual flexibility and unique opportunities of academic life, identify and play to your strengths, but also learn how to be resilient and cope with the inevitable setbacks.

Being honourable, community-minded and kind is important. Not only because it's the right thing to do, but also because your institution and funders will assess you not just on your research, but also on how well you serve your community. You should take your obligations seriously – your behaviour will set the tone of your group, and heavily influence the people you train and their future research, so you need to set a good example.

> *"Although a career in science always seems* to be a struggle, I find it pays to be nice. Remember that life continues to be like second grade, with some kids unwilling to share their toys and deliberately picking on *one another… I find the scientific world is a* much sweeter place if you are generous and friendly. Believe it or not, scientific rigour does not mandate nasty comments in reviews of grants and manuscripts. A big benefit of open interaction is that it inspires collaboration, which helps overcome limitations, whether it simply involves a reagent, an approach, or even a way of thinking that does not come naturally to you, but enhances the impact of what can be *learned."*
>
> Professor Rebecca Heald

Detailed definitions of good citizenship differ between funders, countries and fields, and you should check what the appropriate guidelines are for you. Broadly speaking, they all share the following overarching criteria:

- Research integrity
  You should be honest in your research activities, and in your assessment of the activities of others. You must follow ethical requirements, such as ethical approval processes and establishing appropriate governance, particularly in respect of research involving humans and animals. You should also consider any ethical, safety or security implications that may emerge during a project, including any risks that research outcomes could be misused.

- Research design
  You and your group should design your experiments so that results are robust and reproducible. When reporting findings, you must provide sufficient information to allow others to understand key aspects of the research design and/or data analysis, and to facilitate independent replication of the results.

- Outputs
  Depending on the field, there is a range of research outputs,

including publications, datasets, devices, software and reagents, policy reports, pre-prints and conference contributions, that are used to assess researchers' track records. Document all your different types of research activities: this information often needs to be presented to funding bodies, promotion committees and so on. You should aim to make research data, software and materials generally available with as few restrictions as possible. Where the research output is a paper, many funders and institutions will expect you to follow open access principles for publication. You should also try to publish negative results – they do contain useful information and advance research – by using journals such as [Wellcome Open Research](#) or preprint servers.

- Leadership
Try to foster mutual cooperation and the open exchange of ideas within your research group. It's also vital to encourage your team to develop their skills and to provide them with the resources necessary to deliver research of a high standard. You are also responsible for training and supervising all members of your group to the best of your ability.

See additional resources on [doing global research](#) and on [good research practice](#).

Finally, be nice, but be cautious. Don't tell everyone everything that you're doing, and don't give away all your good ideas in one go. You have to walk a careful line this early in your career, or you may get scooped by someone with fewer scruples and more resources.

Time management

When you're starting out, it's crucial to be incredibly careful with your time. Think very carefully before you volunteer for anything, and try to stay away from too much teaching and administration. You will be asked to do a lot, and it's easy to end up doing too much, especially if you prove to be good at it. Keep this in mind and, when negotiating your contract, try to set limits on administrative duties.

The golden rule is that unless the activity benefits your research, increases your knowledge or is compulsory, it would be wise to say no, at least in the early years. For example, it's okay to run a seminar series or journal club, but taking on responsibility for facilities and sitting on 'housekeeping' committees are thankless and time-consuming tasks. Being helpful will not be what gets you established; what matters is your research, and your research output.

Some other tips:

- To manage time well, know where it goes so spend a week tracking your days and look for inefficiencies. You'll probably be shocked by how much time you spend looking at your phone when you're supposed to be working.
- Identify your priorities, and learn how to drop or delegate tasks that aren't top of your list.

- Set clear goals for everything you do (projects, meetings etc).
- Identify when you are most energised and focus on important tasks during this period. Do 'housekeeping' work in the lowest-energy part of your day.
- Block out chunks of time to do important tasks. Spending an hour with no distractions will help you produce higher-quality work more quickly.
- Make the most of short spells of free time. That 20-minute wait between other commitments (say, an experiment or the next meeting) can be productive – you can probably do something that requires little thought but needs to be dealt with.
- By all means multitask, but make sure that some of the tasks aren't too intellectually taxing or you'll run the risk of messing them all up.
- Keep on top of the literature – keep current, keep fresh. For useful tips on how to do this, see this article from Science Careers.
- Switch off your email alerts, and instead of reading and responding to messages as they arrive, use an email service such as BatchedInbox, which collects and filters your messages and delivers them in a single bundle at a time you can specify.
- Don't spend too much time on your online presence, unless this is expected in your particular discipline. In general, your website should be good enough to attract prospective students

and postdocs and highlight your papers and achievements, but future-proof it as much as possible so it doesn't need constant updating. Regular blogging, engaging in online discussions and the like can be very time-consuming, and are best left for those at either earlier or more established career stages. Twitter may be the best way to engage online, because of its ease and interactivity. However, you need to be careful, as this article from The Atlantic magazine will tell you.

How to say no

All too frequently, your institution might ask you to do things under the category of 'important for your career'. Saying no to these things is an art in itself. Again, you must prioritise, and decline the least important. If you've decided to refuse, it's best to do so quickly rather than delaying responding for months. However, to prevent gaining a reputation for always saying no (which generally results in people ceasing to ask you), you should give the reason, and say you'll be available in the future. For example:

'My travelling is very restricted at the moment due to family commitments, but *things will be much easier next year. I'd be* delighted to come and give a seminar in your department then, but can I ask that you *invite me well in advance?'*

Work/life balance

As an academic you're allowed an unusual degree of freedom and fluidity to shape your work around the other

important things in your life. So even though you have a very short time to make your mark in a highly competitive field, it is possible to have a successful research career and also enjoy life, if you are committed and well organised.

Initially, you may be a one-person operation, or will have a very small group, so in the beginning at least, it will be hard work. But, being extremely focused doesn't necessarily mean working all hours. Fourteen-hour work days do not necessarily equate with productivity. As such it's best to refrain from comparisons with others who might choose and/or have the opportunity to spend more time at work than you do. A little strategic thinking and planning will go a long way towards keeping you in the game without running yourself into the ground.

It is essential to be absolutely clear what your priorities are at work. Your research and your group must stay at the top of your list, while grants, committees, travel etc will have to take second place. Delegate where you can.

As a junior researcher, you'll tend to spend most of your working day at the coalface, but as time goes on, you'll find that much of your work can be done elsewhere. For example, you can usually be at home in the evenings, but you may have to write or read for work, mingled in with time with your family and friends. And just as in your current academic life, forethought matters. Preparing for the next day so you can hit the ground running is essential for efficient time management.

Make space for thinking and block out time in your calendar only for that. You'll find that as your life becomes more crowded, it's harder to idly muse about your work. You'll need to deliberately use downtime to think and theorise about research – in the shower, on the way to work, at the gym and so on. That way, you'll not only keep coming up with good ideas, but you'll be able to plan more effectively if your mind is on the job the minute you get to work.

Finally, don't forget that working all the time can be counterproductive. You also need to take care of yourself. Everyone's needs are individual, so don't let yourself be judged (or judge others) if these seem to differ from the norm. It's important to spend time with your family, have a night out with friends every now and then, and get some regular exercise to keep you fit. Take holidays, have a hobby or two to clear your head and keep you sane, and enjoy yourself outside work as well as in it. A happy scientist is more likely to be creative. Useful tips on how to take that essential time off without feeling guilty can be found here.

Getting the work/life balance right is difficult, but it's a hurdle that many people have successfully negotiated. Talk to your colleagues and friends to find out what worked for them but in the end it's about figuring out what's right for you and your family. Discuss taking shared parental leave with your partner. It's all possible. Read the recent Scientist and Parent collection by eLife and the Parent Carer Scientist by the Royal Society, which celebrates the

diversity of work/life patterns of 150 scientists across the UK, for inspiration.

Working part-time

Firstly, are you really going to work part-time, or are you merely planning to scale your hours down to a normal working week? If the latter, you should ask to work flexible hours. For example, if you want to be at home with your children one day a week but still work just as many hours, that's fine. Don't worry about whether you are visible at work; the important thing is getting the work done.

If you really want to work part-time, it might not be easy at this stage of your career, but by no means impossible with careful time-management and some flexibility from both you and your department. The upside of part-time working is that it forces you to become a master of planning and prioritising, and you will learn to use your time incredibly efficiently early on.

Remember, most people at the top of your field are also running their groups part-time: as well as doing research, they will probably be in charge of a department or institution (or even a funding body, such as the NIH), and have substantial additional commitments, such as committee work and consulting. So don't regard yourself as below par if you too need to spend time away from your group due to other responsibilities. Comfortingly, the academic climate is starting to change and look more favourably on alternative working arrangements. Most funders take career breaks (eg parental leave,

sick leave) into account and allow for part-time work.

If you work part-time, you'll have to acknowledge that your absence may at times be hard for your colleagues, and take steps to ensure their disruption is kept to a minimum. Make sure that your team and your department know that you are planning ahead, so they continue to have confidence in you – you have to look supremely well organised and in control. And don't be afraid to arrange help; if you're doing an experiment, and need someone to set up something on a day you're not there, ask.

Get yourself a mentor

Or better still, several, locally at your institution and elsewhere. You'll need different people at different times. It is crucial to find someone you can trust and to avoid people with vested interests. As well as helping you to make the right connections and looking out for your interests, they're incredibly important as sounding boards, deliverers of honest opinions and advisers when things go wrong. They can help you by allowing you to discuss your concerns openly in situations where you feel unable to expose perceived weaknesses to your new colleagues.

The Academy of Medical Sciences has a mentoring scheme for postdocs, and similar formal mentoring arrangements for early career group leaders, run by both funders and institutions, are becoming increasingly common. Universities in London offer a mentoring

scheme, B-MEntor, for academic and research staff from BME backgrounds.

You don't have to (or shouldn't) rely only on official schemes and channels in finding a mentor. Long-lasting connections can also be made by simply talking to people at scientific meetings and courses, or meeting people through mutual acquaintances. For helpful hints on how to seek your own mentor or sponsor, see this article, from Science Careers. For the differences between role models, mentors and sponsors, and some real-life examples, see this page from Oxford University. As for role models, there are some inspirational bloggers out there, such as Athene Donald, whose writings on the privileges and problems of research are perceptive and thought-provoking.

That said, you should also beware of over-mentoring. Spending too much time with your mentor can get a bit too introspective. Don't forget you still have to get on and do the work!

Combining a clinical and academic career

Running a research group in parallel with clinical commitments is challenging but can be one of the most rewarding career paths to take. Varied work environments that make full use of your combined skills can be extremely intellectually stimulating. Your clinical background gives you a distinct perspective to tackle questions that scientists without the medical training couldn't. And your research can have a wider more immediate impact as you'll be uniquely placed to realise innovative healthcare

solutions. There is, of course, no one-size-fits-all approach to finding the right balance between clinic and academia. Yet, with careful planning and organisation, you can have the best of both worlds.

You need to be very clear about what your commitments are on both fronts and to coordinate your clinical and academic obligations with your supervisors throughout your training period. Plan well in advance when choosing your speciality, keeping those obligations and your own priorities in mind: outpatient treatment is likely to be more predictable and therefore more accommodating to your research activities than emergency care. Consider being employed as a supernumerary: this would again help to protect your research time from potentially increasing medical commitments. A few critical points to pay attention to can be found here. You also need to make sure to know the conditions for career advancement on either track. Identify what's feasible and be specific with respect to your obligations and your availability when negotiating your contract.

A supportive work environment and senior management who see your unique role as an asset are crucial. Seek mentors from both worlds or, better yet, find someone who has combined their clinical and academic careers successfully. Make people aware of your dual identity. Let colleagues and patients know that you're both a clinician and an active scientist and they will be more understanding of your time restrictions.

Choose a research topic that's complementary to your clinical activities and vice versa. Try to take full advantage of your medical know-how and clinical resources (eg availability and access to clinical samples) when designing your research plan. This will help you to establish your own niche and also open up more funding opportunities. Try to set up collaborations to enable you to maintain your research output at times when clinical commitments are more demanding. You will be spending large chunks of time away from your group. Foster independence, and delegate – experienced technical staff, senior postdoc or a lab manager will help with that. Remember to make use of one of the biggest perks of academic life: its flexibility.

Finally, the key to all of this is efficient time management. You have to get good at prioritising, and setting and sticking to your own boundaries. That includes taking time off for your personal life.

Take a look at these practical tips and real-life stories for more information. Additional input can be found in this useful book chapter by the Howard Hughes Medical Institute: some of the above suggestions were condensed from this resource.

Self-promotion is good

You're an academic in a highly competitive world, so feelings of inadequacy and self-doubt come with the territory. Don't let yourself succumb to 'imposter syndrome': that awful feeling that you don't belong, that you're just faking it, and one day someone will find out. Research indicates that nearly all

academics suffer from this to some degree; this excellent article from Nature offers strategies to help ensure you only have a mild dose.

Doing wonderful research that gets you grants and allows you to publish excellent papers are good bolsters against imposter syndrome, but why not put yourself up for some prizes and awards, too? It's a win-win situation: if you get the award, it's great for your career; if you don't, you've had an opportunity to make useful contacts and to measure yourself and your research against some objective criteria, which will help your future strategic planning. If in doubt, ask your mentor about it (not your departmental head, as they may have other people higher up their priority list). Read this article from Science Careers to convince yourself it's a good idea.

The Cancer Research UK Women of Influence initiative gives rising female science stars the opportunity to be mentored by successful businesswomen.

Here, one of the mentors, Cary, talks about her protégée, Sarah:

"I picked out an award (the Women in Research and Engineering Research Award) I thought I could enter Sarah for and she won it! Now, when Sarah's recruiting, and people see she's an award-winning researcher, it's going to attract talent."

Sarah agrees the award has been really *helpful: "Since Cary helped me overcome this problem with self-promotion, I've entered and won other awards. I'm on a bit of a roll now! The last position I recruited for received 65 applications – it took me a whole day to read the CVs."*

There are some obvious things you can do to present yourself and your work in the best light. Firstly, never publicly dismiss your research as less significant than it is. If you don't believe your work is as interesting as everyone else's, why are you doing it? And don't be too self-deprecating – a surprising number of people will take your comments at face value! There are different approaches to this in different countries – make sure you are aware of the cultural norms of your environment.

To ensure you do your research justice when presenting it, ask trusted friends and colleagues for advice and frank criticism on everything you plan to show to the outside world. Get readers for your posters, papers and grant applications, practise your talks, endure mock interviews – and give back freely in kind to those who help you.

Remember, if you have some of the skills and experience required to fulfil a role, go ahead and apply for it. Don't assume that you need 100 per cent of what is being asked for.

Coping with set backs

As with any job that requires continued performance at a very high level, research can be stressful. In addition to the failures and disappointments inherent in doing the best research, you could have difficulty coping due to illness or family circumstances, or might be bullied or harassed.

Failure

Worrying about failing can be corrosive, so it may comfort you to know that every researcher, however successful, has failed many times in their career. You will fail to get your papers published, and fail to get grants, you will make mistakes, some of which may be substantial. The only thing to do is to learn from your mistakes, evaluate what could be done differently next time, and then let it go. It's important to set timelines and establish criteria as to when to cut a dead-end project despite having heavily invested in it. It's painful, but sometimes it has to be done.

Indeed, good research almost always involves failure, particularly when trying to develop cutting-edge techniques or revolutionary ideas. If you're not willing to fail, you're probably not being adventurous enough.

 "Because I failed at so many things so often, because I was in a mess, it gave me a sort of internal discipline – you take less note of what other people think of you, what *other people say, because you don't get off* on being praised about things. I had to be resilient inside. I was constantly comparing me to me when I did well, and not with other *people. I realise it's very odd, but it's really* useful, because when I failed examinations, *I couldn't get into university, I couldn't get a* job; when you put all that together, it was a constant low to medium level of failure about things. So when I got to difficult problems *and I failed, I didn't go into depression or* anything. And when you get into research, *it's constant failure all the time, and I was* perfectl*y trained for it."*

Sir Paul Nurse,

Nobel Laureate 2001

Harvard's Success-Failure Project includes useful articles and tips for dealing with failure in academia.

Bullying and harassment

Sadly, bullying and harassment, including sexual harassment, are not unknown in academia. If it happens to you, it's important keep in mind that it's not your fault! You should not feel guilty or embarrassed. Or that you have to deal with it alone or ignore it – seek help as quickly as possible to prevent the situation from damaging you any further.

One challenge of dealing with bullying and harassment in the workplace is that the instigator may not be aware that their behaviour is inappropriate. This is where clear communication can be vital. Seek advice from your mentors and colleagues you trust, and/or external advice from organisations such ACAS, Switchboard LGBT+ or Scope (support on disability issues) to plan how you will approach someone about their behaviour. Here are a few more practical suggestions that can be helpful for dealing with offensive comments on the spot. Some institutions have networks of bullying and harassment advisers (sometimes called dignity at work advisers) who can provide confidential support and advice and signpost you to other services. As difficult as it is, sometimes the only way to resolve this serious issue is through formal channels.

When life gets in the way

It may sound trite, but it's important to acknowledge that you are not a robot. There will be times when you are ill or when family responsibilities make it hard to work at full stretch. Never forget that you are a valuable resource – it makes sense for institutions to support their highly trained, highly talented people through periods when they are less productive, and help them return to their best. Know your institution's policies on illness and leave, and don't be afraid to ask HR or someone you trust for advice and help if you hit a bad patch.

Given the pressures of doing research, it's possible that you will feel mentally exhausted or depressed at some point in your career. It's important to realise that you are not alone: a staggering one in three people experience a mental health problem each year. You wouldn't let a physical illness linger for weeks or months, so treat your mental health similarly and, if you're worried, seek help sooner rather than later. The self-motivation and enthusiasm needed to conduct research will rely on your ability to take care of yourself, maintain your mental wellbeing and recognise when you need to take action to improve it. You may find it helpful to look at this resource, from Imperial College London, on mental health and wellbeing and how to promote it.

Section 3: Leading your group

Hire the right people

As you embark on this new adventure, it's important to recognise that your group isn't you. You can't expect the same from them as you do from yourself – you have to work with their aspirations, limitations and strengths to get the best from them. Becoming a good, thoughtful leader, committed to fostering the development of everyone in your group can be incredibly rewarding. Irrespective of discipline, you may consider attending one of EMBO research leadership courses, which cover the basics of people and project management (eg dealing with different personalities, effective communication skills and time management). There are many leadership courses out there, some centred on a certain topic or targeting a specific audience. It's worth finding one that suits your requirements as you will benefit immensely. This article, from Science Careers, highlights some common management mistakes.

When recruiting group members, cast your net wide: use mailing lists and job portals, and spread the word through colleagues to advertise positions. When hiring, remember that unconscious bias may creep into the process, as illustrated in this animation, created by the Royal Society. If your institution provides unconscious bias training, you're strongly advised to take it.

Some other points to think about:

- Be extremely careful who you hire first – the first two or three people will set a culture that will likely be with you forever, so never hire someone you dislike, no matter how smart you think they are. It's better to hire nobody and re-advertise than to hire the wrong person. You want coming in to work every day to be something you and your group look forward to.

- Be wary of hiring people with the same background and interests as you. Your inclination to like them may fool you into making assessments about their competence based on your innate biases.

- You need to have diverse opinions in your group – if you hire clones of yourself or your existing members, you won't get the intellectual stimulus of constructive arguments. Questioning is what leads to progress, so ensure your group has the breadth of backgrounds, talents, skills and knowledge needed to spark original thinking.

- Hire tactically – take the opportunity to employ people with skills that complement yours. For example, if you're poor at finishing things off, hire someone who will make sure your brilliant but

slightly messy insights materialise in solid data.

- Get your group to interview candidates too. They may not make the best intellectual assessment but their feedback about social fit will be really useful. Assess how far you can trust their judgment though – it's possible they may not want people they feel intellectually threatened by.

- Organise a panel interview or have senior colleagues (possibly with different expertise) interview your candidates individually – independent insight is invaluable. It's also useful to sit on other interview panels yourself, to get better at evaluating potential employees in a short space of time.

- Check all references carefully. Be aware of the cultural context: the tone and the format of references can be quite different in different countries.

- If possible, pick people who you believe are smarter than you. It's easy to feel intimidated by them, but recognise that, properly managed, they will help your research immensely. However, don't confuse confidence with competence. And remember, the best grades and the highest ambition do not necessarily make the best scientist.

- Watch the balance of the group. There has to be a good balance between experienced researchers and those, such as research students, rotation students and undergraduates, who require more support. One seasoned postdoc and five PhD students may be the cheapest option, but not the most productive if the students take a long time to grow in competence. You need to be aware that the productivity of your senior staff will be affected by how many junior colleagues you assign them to 'babysit'.

- A really good, experienced senior research assistant is like gold dust – although they're hard to get. They will not only be more skilled than most others in your group, but they will be a long-term memory bank, keeping track of reagents, techniques and communal knowledge. They're also useful conduits between you and your junior colleagues, especially as you become more senior – your group will often be franker with the research assistant than with you, allowing you to pick up any problems quickly, so you can fix them sooner.

- Don't get too big too fast. If you're successful early on, you'll inevitably get more people applying to work with you. This is great, as you'll be able to pick from a larger pool of candidates, but there are downsides too. Go for depth of talent rather than strength of numbers – keeping on top of a rapidly growing group while maintaining a high quality of research is extremely difficult if you get carried away and hire some people who aren't up to scratch. And there's a point at which big groups can become counterproductive; your research output will cease to increase significantly if you're unable to supervise your group properly.

Create a happy, productive group

Your team will work best if they're happy, motivated and share common goals, so aim to create a positive atmosphere where they will want to work hard. Don't use your people as tools; instead, inspire them about the joy of doing research and the excitement of your communal research goals. They'll willingly join you in your quest for results, and you'll probably have a lot of fun along the way.

You don't have to be a bouncy extrovert to be a great leader. There are many ways to be inspirational but, unless you're lucky enough to be a natural, it will take work – and you won't always get it right. However, you'll have time to develop your skills. If it's just you and one other person at the start, it will be easy initially, especially as you're likely

to be roughly the same age. Being a warm, approachable, yet firm leader is a
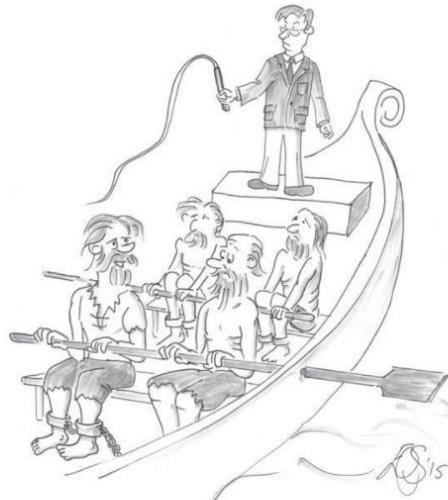
"Apparently he learned his technique from supervising grad students."

departure from your previous footloose existence in someone else's group. You'll need to strike a balance between encouraging a meritocracy where your research is concerned and being the one in charge. You aren't just a researcher now, you're also a manager, and that's difficult to adapt to. You will need to gain the trust of your group to deal sympathetically and discreetly with their problems and be considerate of their needs (eg flexible working hours, work/life balance). You'll also be the person assessing their performance, sometimes critically, and writing their references.

Creating the right environment for free and frank discussion is now your responsibility. Your new colleagues will be junior to you and, while keen and motivated (if you've hired the right ones!), they may be reluctant to tell you if they believe your ideas are bad or wrong for fear of annoying you; they may also come from cultures where disagreeing with a senior colleague is

frowned upon. If you don't create a culture where everyone feels valued and knows their ideas will be taken seriously, you risk stifling the creativity of your group.

Remember that everyone's opinion is relevant, from the undergraduate doing a rotation project, to you. Someone coming in from outside may have excellent ideas or a totally different viewpoint that sheds new light on a long-standing problem. Everyone holds a different piece of the puzzle, and it's never clear until the puzzle is complete who will be responsible for the last piece fitting into place.

Give everyone space to flourish in the way that best suits their character and you'll get the most from your group. People will have different ways of discussing ideas and reaching conclusions. Don't assume that someone who takes little part in discussions is devoid of insight – some people talk their way to a conclusion, while others think their way there before venturing to speak. Cultural background can also influence how people express themselves.

Be patient with errors, whether practical or intellectual, and make it easy for people to ask questions, however silly they may seem; often, the apparently simple questions get right to the heart of the problem. Don't be afraid to ask a few daft questions yourself – it's a great way to get others to open up. If there really seems to be a fundamental lack of understanding, a useful tip is to ask your colleague to tell you what they think you said. This works in reverse, too: repeat what you think their point is if you don't quite grasp what they're getting at.

Share some of your own current and past struggles at work. Being open about failures will encourage others to be forthcoming about their problems and mistakes. Solutions can be found quicker. And there is less pressure to produce 'perfect' results or misrepresenting the data.

You'll probably have to adapt your style to interact effectively with everyone. If you're an extrovert, you may have to tone it down with some people, especially if you have a taste for heated debate. If you're an introvert, you may have to become a little more forthcoming so your group feels that you're paying attention to them.

Obviously, there should be no favouritism. Try to give everyone the attention they need. This is especially important if some projects are more successful than others. Take the energy and excitement you gain from the projects that are working and feed that through to the people who are struggling.

Finally, think before you speak – throwaway remarks are taken far more seriously when you are the boss.

Meeting your responsibilities to your team

It's important to recognise that as you progress in your career, while your primary aim is to do great research and get established, your role will increasingly be to train junior people. It's your duty to look after your research team and ensure they have the best

possible opportunities and advantages. This is your time to pay back the support and mentorship that you received early on from your bosses and mentors.

Your obligations towards your group members will differ depending on their positions. You should ensure that you fulfil your management responsibilities to each person and also take these into account when designing and distributing research projects (re timeframe, feasibility, potential backups). For example, the role of a PhD supervisor is clearly defined, and there are distinct milestones that your student will have to pass. Your obligations to other staff will almost certainly include regularly supporting their progress and professional development.

Be appreciative

When you describe to business people how researchers get rewarded, they're astonished at the degree of self-motivation required and how thankless a task research can be. It's rare to hear someone being publicly praised or thanked.

Rather than just picking holes in their data, thank your team members whenever they do a good job: look for positives and praise your people to others, especially those whose opinions matter. Praise leads to confidence, which leads to harder working, which leads to more results – so it's a good idea on all fronts. And remember, your research relies on a solid foundation of administrators, project managers and technical staff – don't forget to include them in your 'thanking list'.

Foster community spirit

- Team meetings are important – make sure there are regular times for the whole group to get together.
- Small gestures can go a long way – bringing in a cake for no apparent reason is a simple way to boost everyone's morale.
- Team celebrations are important – make sure there are opportunities to have fun together, doing things that everyone can join in; going to the pub shouldn't always be your top choice.
- Create a group structure that encourages cooperation and trust between members.
- Never set people up to compete against each other on the same project – but do get them to collaborate on related aspects. As well as speeding progress, this will give you an extra eye on the project.
- Distribute chores equally between all team members, including you.

Encourage independence

In an ideal world, when you are unavoidably absent, your group should continue to work like a well-oiled machine, and be open to taking the initiative when appropriate. While some of this comes down to having good people and well-planned projects, an environment where everyone feels able to voice their opinions, without fear of being belittled, and where independence is encouraged and nurtured, is invaluable.

Delegate

Besides doing experiments and learning to be intellectually rigorous, there are many things your group members must learn to become successful researchers: running a project, writing papers and grant proposals, reviewing papers, giving talks, sitting on committees – the list is long.

It's rare that someone will be immediately able to do all of these to your satisfaction, and it's tempting to just do them yourself, but it's worth learning to delegate, as it relieves you of some of the daily grind, and shows that you value and trust your team. If you give good feedback (identify positives, find the areas of improvement, be concise, concrete and constructive in your suggestions) you should see improvement. At the same time, make sure to ask for feedback on your supervision to improve yourself.

When starting out as a group leader, you may be reluctant to delegate for fear of losing power or control. However, part of becoming an independent researcher is learning that assigning responsibility does not lessen your role, but rather gives you the capacity to handle greater responsibility. In addition, delegating serves to empower and motivate the people who work for you.

In deciding whether there is something you could delegate, ask yourself these questions: What am I doing now that I'd like to see someone else do? Is there a person in my group who is capable of handling and willing to take on a new responsibility? What could I do if I had more free time?

Once you've decided to delegate a given task:

- Be sure you delegate the necessary authority with the responsibility.
- Give clear directions and make sure they are understood; keep two-way communication channels open.
- Clearly define the responsibilities assigned to each team member and make this information known to everyone in the team.
- Follow up to make sure the job is being done, but don't start interfering. It may not be done in your style, but does it matter?
- Distribute responsibilities fairly.
- Be sure to back your delegate if their authority is called into question.

After the first few years, when you should take every opportunity to give talks about your work, you should begin to give your senior postdocs and graduate students the chance to give talks in your stead.

Be a good mentor

You're now in a position to mentor and sponsor other people, which is exciting and gratifying, but a huge responsibility. You can of course learn a lot from your own mentors, both in what they're good at and what they lack. Nature's Guide for Mentors offers very useful pointers to set you on your way. Mentoring can take a great deal of time though, so be selective – don't spread yourself too thinly, and try to pick the people who will benefit most.

Help your team get the best jobs they can

One of the metrics for judging the success of you and your group is where your people go next. Ensure your junior colleagues are properly prepared for their job search. Check their CVs, read and criticise (but do not write for them) any written applications (including grant proposals), and make sure their presentation skills and proposed talk are of a high standard. Run mock interviews, recruiting other colleagues if necessary to stand in for a job or grants panel. Supporting your team members' future career will help your group to gain a reputation of being a good place to work and hence increase your own ability to attract the best people to work for you.

See this article by NatureJobs about helping your group get jobs; and read this HHMI booklet on something that's crucial, yet rarely taught: how to write a letter of recommendation.

But…

You must be brave enough to tell someone if they're not on a trajectory to succeed. They may ignore you, but it needs to be said. It's kinder all round to tell someone you believe they're not going to make it as a researcher – they'll have the chance to switch career at an early point, and your reputation for looking after your team will be enhanced.

Dealing with difficult situations

Inevitably, problems will crop up in your group that you have to deal with.

Examples include poor performance, illness (both mental and physical), disputes over authorship or ownership of results, bullying and harassment, and even sabotage.

As a general rule, communication is the key and it's better to address problems early on. Here are some suggestions on how to handle difficult conversations, by Harvard Business Review. Remember that whatever problem you face, it's likely that someone has dealt with it before. Don't be afraid to ask other people what they would do – your mentors, colleagues, former bosses, or anyone you can trust and confide in. Talk to them before consulting your institution's HR department.

Your institution will have procedures in place to deal with many or all of the problems you may encounter, and you should familiarise yourself with who to seek advice from. For mental illness, Mental Health First Aid England has this useful resource for managers.

It is also vital to be aware of your own behaviour and open to receiving feedback on it – you may be disconcerted to discover that some of your actions have been construed as harassment or bullying. Look at this resource in Forbes magazine if you're worried you may be turning into a bully. If you are, and you can't get out of the habit by monitoring yourself, seek counselling: chronic bullying behaviour often has deep-seated causes that you may need help to untangle and fix.

Research misconduct

This is defined by the US Office of Scientific Integrity as fabrication,

falsification or plagiarism in proposing, performing or reviewing research, or in reporting research results.

- Fabrication is making up data or results and recording or reporting them.
- Falsification is manipulating research materials, equipment or processes, or changing or omitting data or results such that the research is not accurately represented in the research record.
- Plagiarism is the appropriation of another person's ideas, processes, results or words without giving appropriate credit.
- Research misconduct does not include honest error or differences of opinion.

As a lead investigator on your projects, it is your responsibility to identify and prevent misconduct. Improperly conducted research damages your reputation in your local research community and if propagated through your publications may detrimentally affect your research field. Try to:

- make sure everyone understands what constitutes fraud and plagiarism
- foster an environment where it is okay for people to admit their mistakes
- never pressurise people by saying that getting a particular result is vital
- if possible, stay close enough to the raw data that you are able to assess whether undue manipulation has occurred

- understand statistical methodology well enough to be able to challenge your group on their use of it
- be on the alert for potential fraud; there are some classic red flags, as described in this article.

If you're unfortunate enough to have a case of fraud or plagiarism in your group, be as open as possible about it. While your reputation may suffer some short-term damage, honesty is the best policy. For an example of how to handle fraud well, read this interview with Daniel St Johnston.

Section 4: Building your reputation at your institution

Who's who at work?

Get to know the structure and hierarchy of your workplace. Find out who's important and who you need to meet and arrange meetings with them. As importantly, find colleagues with similar scientific interests to yours – they're your best resource for news, advice, discussion and collaboration.

Career advancement

Know what your next steps are and how to take them. For example, you may need to have experience of:

- teaching
- serving on committees
- contributing to strategic planning
- public engagement
- policy
- service to the scientific community.

Choose your extra activities wisely

As mentioned under 'Time management', don't fall into the trap of sitting on too many 'housekeeping' committees or being foisted with roles presented as being 'appropriate' for your interests. Be a good citizen, but remember that getting a reputation for taking on the dull, worthy jobs nobody else wants to do will not help your image as a cutting-edge researcher.

Internal committees

Be judicious in your choice of assignments. Some committees, especially those that review individual research protocols or applications, are very labour-intensive. Others may deal with politically sensitive matters that may be difficult for a new group leader. For example, you might not want to be on a curriculum committee if a controversial restructuring is under way and your department has a stake in the outcome; such an assignment would be best left to a more senior colleague. Other committees may deal with matters irrelevant to your concerns as a researcher. So, before you accept a committee assignment, ask for a detailed description of what will be expected of you in terms of time commitment and the nature of the decisions to be made. Committees should also have written terms of reference to which you can refer. Many committees do give a decent return on your time. Serving on a search committee may give you a voice in deciding who a new colleague will be and thereby also influence the general research agenda of your institution. You might also want to be on a committee that puts together a seminar programme or scientific meeting. This will give you a chance to invite your former colleagues,

leaders in your field, and new people with whom you may want to network. Working on an admissions committee for graduate students might be worthwhile because it will introduce you to graduate students who could work in your lab. Participating in specific facility committees (eg animal facilities, protein purification) can be useful if you depend heavily on their services for your work.

A good strategy is to try to get on committees where your expertise will be useful but you will not be overburdened. Ask your department chair and mentors for advice on balancing committee work with your other obligations.

Scientific citizenship

You must demonstrate that you are willing to work for the betterment of the university, your profession and the public at large. Service on departmental and other campus committees, research ethics boards, editorial boards of journals and grants committees shows your willingness to assume your share of responsibility. Invitations to sit on editorial boards and grants committees also demonstrate academic recognition outside your institution. Work for professional associations and as a consultant to government and industry also counts, although you'll need to check your institution's guidelines on conflicts of interest and allowable days spent on other work.

Patient and public engagement

Public engagement can be split into two varieties: either essential for your

research (such as recruiting patients for clinical trials and cohorts) or fulfilling your obligations as a good research citizen. If you're unclear about the former, seek expert guidance from the appropriate bodies in your field and your institution's ethics and procedural committees.

The latter form of engagement is increasingly a requirement for receiving funding, but is valuable and necessary in itself. After all, if you're in research for the long game, it makes sense to interest and educate the public, perhaps including a future star researcher (or government minister in charge of the research budget) about your discipline. However, as in everything that does not directly benefit your research, you need to be careful what you choose to do. If possible, try to ensure that it suits your character – not everyone is happy dancing on stage at a telethon dressed as a duck, for example. Fortunately, the definition of public engagement is broad, and you and your group will be able to find the niche in which you are happiest.

The list of activities that count as public engagement includes: working at festivals, museums, galleries, science centres and other cultural venues; involving the public in the development of research and in research itself; presenting to and writing for the public; and working with young people, either broadly, or individually in mentoring schemes. Your funder and/or institution will almost certainly have well-established public engagement programmes, but for further advice and tips, see the National Co-ordinating Centre for Public Engagement website.

Section 5: Building your reputation in your field

While you won't get far unless you're a good and innovative researcher, there's more to a successful career than doing great work. Many early career researchers fail to recognise that becoming a visible and valued member of the research community is also important. Even the world's most brilliant researcher has to work out how to smooth the path to getting their work recognised. Good work needs to be noticed – and you need to help that happen.

To stand out from the crowd, you must first do excellent science, but also build relationships with other researchers, funders and journals and, depending on the field, perhaps with policy makers, patient advocates and the media. In other words, you need to become an effective networker.

In addition to getting your name out there, networking will allow you to keep up with what's going on. When you're starting out, you can no longer rely on the prestige and visibility of your former boss or institution to open doors and gather research intelligence; it's up to you to keep the channels open to the outside, rather than turning inwards and focusing on your lab. If you don't, you'll miss new advances and/or become solidified and mediocre in your thinking.

How to be a good networker

Even in these days of mass social media use, the best way to network is face-to-face, as this quote illustrates:

> *"Even in very large communities,* such as the biomedical research community documented by MEDLINE, it takes an average of only about six steps to reach a randomly chosen researcher from any other, of the more than one million who have published. We conjecture that this has a profound effect on the way the scientific *community operates… it is probably* safe to say that the majority of scientific communication still takes place by private conversation... *allowing …news of important* discoveries and scientific information to reach most members of the network via such private *conversations."*
>
> From MEJ Newman (2001) Proc Natl Acad Sci USA 98:404-409

Building a network

- Start early – often, many of the people you meet as a PhD student and postdoc will be around for your whole career.
- Everyone is a potential link to someone else, from the newest member of the media kitchen to the head of department, so be

omnivorous. It pays to befriend a lot of people.

- You are who you know. As in life, there are never more than six degrees of separation between you and the researcher you wish to meet.
- You have to give in order to get, but give without expecting to get back.
- Always share your networks – then people will start to come to you as a network connector.
- If you help someone in your network, word will get out, and everyone in your network is more likely to help you.
- Don't forget to thank the people who help you.
- Be in lots of groups, or if that's too much for your personality type, be friends with a major networker.
- Lasting connections and sustainable networks can only occur when based on making deals or liking each other. Begging or stealing doesn't work.

Connecting with specific people

How do you get to meet that important person in your field? You need to prepare the ground by doing as many of the items on this list as necessary. A multi-pronged approach is better than a series of single actions.

- If you need to approach them without an introduction, read this article for some handy tips.
- Ask a mutual acquaintance to introduce you.

- Do something useful for the person, so they can build trust in you.
- Make sure you're on the programme for visiting seminar speakers you want to meet.
- Invite the person to give a talk. If you think they'll be reluctant, enlist the PhD students to talk to them – few people shirk their responsibilities for talking to younger researchers.
- Do your homework before conferences – who do you want to meet and how will you get to them? Set up a meeting by emailing in advance (or getting a mutual acquaintance to do so for you), if possible.
- If you'd like to ask for something, make sure it's a sensible, concrete request that makes it as easy as possible for the person to help you. Ask for specifics, not generalisations – eg rather than *"Do you know someone who can help me with my project?", say "I* need to learn about single-cell metabolomics – can you put me in *touch with Dr X?"*
- Organise a conference or a panel and invite everyone you want to meet.

The Science Research Careers website has many useful articles about effective networking; most of the bullet points above are distilled from those. To find out how to get most out of attending conferences from here.

How to be a great collaborator

Collaboration is becoming increasingly important for scientific research, both within and beyond usual disciplinary boundaries. This makes it all the more important not to simply fall into collaborations, but to act judiciously so you have the best chance of using them as powerful ways of extending, building and sharing expertise, methods and ideas.

Collaborations may be short-term – when you need some specific expertise to finish a paper, but they can also last for years. At their best, collaborations can totally transform how you and your collaborators think about a research problem and reward you with an intellectually stimulating scientific support network for years to come. But if not tended carefully, collaborations can also be interpersonally exhausting and deflating. Any collaboration will involve an element of risk – so even if you don't know exactly where you're headed at the start, it's worth keeping in mind what you are hoping to gain from it. Is it help with methods you're unfamiliar with; access to communities and networks; the possibility of success with certain grants or funders (many funding bodies have specific streams to promote collaborations), or the challenge of working up new paradigms and approaches?

Good collaborations often begin serendipitously, so think about places and situations that offer the chance of meeting potential collaborators. Look out for residential workshops or 'sandpit'

sessions: funders and professional bodies are increasingly bringing together people with different sets of expertise, in attempts to ignite collaborations. You don't need to jump into making commitments; choosing your potential collaborators often demands spending more than a day with them. Making contact with colleagues at your new place of work can also open new directions in your research – and over weeks and months, initial ideas and possibilities can germinate into a collaboration. Often collaborations are easier and more compelling if there aren't huge differences in seniority or power, as this will allow each participant room to manoeuvre and to take a certain level of risk.

Collaborations can be both exciting and frustrating– you might not realise how different conventions are in different sub-fields, let alone different disciplines. These different disciplinary conventions and practices can end up scuppering collaborations that set out with the most cordial intentions. It's therefore worth continually checking in with your collaborators to try to ensure things are going smoothly. Collaborations will necessarily demand a loss of total control – be honest with yourself about where your limits lie, and be ready to communicate these to your collaborators.

Working Knowledge is a useful resource for interdisciplinary collaborations (funded by Wellcome Trust), and there is also a Nature special issue on this topic. For an excellent and entertaining introduction to the art of collaboration,

see [Rethinking Interdisciplinarity across the Social Sciences and Neurosciences](#), by Felicity Callard and Des Fitzgerald.

Interactions with industry

If your research is of a more translational nature you may want to look into possibilities of collaborating with the pharmaceutical industry. In addition to the possibility of eventually commercialising your findings, the benefits include sharing research expertise and access to potential new tools and resources. Alternatively, you could be approached by the industry to consult for them. The direction of the initial interaction will set the tone for the future collaboration.

As a general rule, the company makes the first contact to be advised on a specific issue in your area of expertise, with a definite output and defined timeframe in mind. Conversely, if you're the initiator (eg through investigator initiated trials and studies programmes, or through strategic partnership your institution may have in place), you're likely to have more influence on the scope of the developing project. As always, good communication and clearly set out rules are critical for the success of the potential joint endeavour.

Once the interest in collaboration or consultancy has been established, contact your institution's Technology Transfer Office (TTO). It is there to prepare the paperwork and has all the necessary expertise and experience to facilitate the process. This includes everything from managing the specifics of the intellectual property ownership

and patenting to clarifying the conditions for presenting and publishing your findings (contrary to general belief, companies are not universally against this!) and confidentiality agreements, as well institutional limitations concerning your time commitments. It's best to let the TTO handle the technicalities of the negotiation and iron out any contractual inconsistencies. Using the TTO as an intermediary will also help to maintain your good relationship with the company, and allows you to stay focused on your science. For additional suggestions on collaborating with industry see this [guide](#).

Get your papers published

Ultimately you want to report your findings, most often in the form of a research paper. Publishing in prestigious venues certainly helps, but in the end it's the consistent high-quality research output what makes your mark in science. Funding and hiring committees are strongly encouraged to focus on the content and significance of candidates' research, and not on the impact factor of the journals where their work is published. It may be tempting to wait for the 'big' story to go for one of the more glamorous journals, but bear in mind that unless you're extremely lucky, bigger stories can take longer to compile and you may risk getting scooped in the process. Unfortunately, the practice of aiming only for very prestigious journals and completely refraining from publishing unless the journal is of a certain status is not uncommon – but it is highly unethical! It is wasteful of research funding and of people's work and can be detrimental to their future

career. Be a good citizen and aim to publish all your findings. All solid data, including negative results, take science forward and deserve to be made public.

You're likely to want to publish your work in different types of journals. It is important to be aware that the nature of publishing is changing, with a switch in the biological sciences towards non-traditional preprint servers such as BioRxiv, and open access publishers such as Wellcome Open Research and F1000Research. More and more journals acknowledge preprints and most funders take research published in these venues into account as a valid research output, so it's well worth considering publishing your findings in this format.

Before you submit, it is a good idea to present your work at scientific meetings, to get feedback on your results and understand if your study is ready for publishing, establish your intellectual ownership of these particular findings, identify potential shortcomings of your study, and find inspiration for new experiments to take your project forward. This is also the way to evaluate which audience (research fields, journals) is most excited about your science and thereby helps you choose the most appropriate outlet, that's potentially interested in your research question, model system, and experimental approach, for submitting your manuscript.

Of course, before you submit a paper anywhere, it should be impeccably written and presented. Writing a good paper is similar to writing a good grant application: it has to be concise and deliver your message clearly. Make sure

your paper has been thoroughly read and frankly critiqued by people you trust to do a good job. Grammatical errors, typos and bad figure design and layout are annoying, detract from the scientific content, and will bias reviewers against you.

Once you've done your homework, prepared a manuscript and decided on submitting to a specific journal, it pays to drop the editor an email before you send a pre-submission enquiry – to briefly describe your work in enthusiastic, eye-catching terms, and ask them whether you can have a chat or if they would be interested in reading the full manuscript. Choose an editor who's been recommended or is known to be interested in your line of research, if you can.

If your paper is rejected

When your paper gets rejected, take a deep breath, step back, and read the rejection letter carefully. It may be, that despite your best efforts the editor doesn't consider your paper to fit the scope of their journal, and in that case it may prove difficult to convince them otherwise. If the paper has gone through a review process, it's important to know that a rejection does not necessarily mean no, unless substantial technical flaws have been identified. Some editors may reject a paper they're uncertain about, and then see what the authors have to say. So the golden rule is to take some time to calmly and thoroughly study the rejection letter and, if you think the reviews are not justified, get in touch with the journal.

- If you think the editor and/or the reviewers have missed the point of your paper, or are being unfair, write an email to the editor handling your paper stating your carefully compiled counterarguments or, if you wish, ask for a phone conference (which may or may not be granted), and briefly list the things you'd like to discuss with them.

- Be polite: do not harangue the editor or make personal comments about the reviewers. State your case logically and calmly.

When the journal is asking too much

You may feel that the list of things to make good before the journal will publish your paper is too long for you to consider. When deciding whether to pull the paper and submit it elsewhere, seek advice from your colleagues, but also consider the following:

- What are the chances that the data will take so long to collect that the journal may reject your paper anyway as it is 'no longer novel'?
- Do you have the people to complete the tasks required? Be realistic.
- Are the suggestions reasonable and will they add another dimension to the paper, rather than being 'belt and braces' requirements?

- Does it seem that a specific outcome of revision experiments is required to get the paper accepted? If so, beware of the temptation to produce 'fitting' results.
- Is speed more important than 'prestige' publication? You could publish on a preprint server first, resubmit to a different journal and publicise your work by other means.

How not to respond to reviewers' comments.

- You can often speed the turnaround time on a different journal by asking for the original reviews to be taken into account.

What to do if you get scooped

If you work in a highly competitive field, it may happen that there'll be a day when you find yourself reading about your key findings in someone else's paper. Unfortunately, you've been scooped!

It will be incredibly frustrating but the key is not to despair. It rarely means that your paper must now be consigned to the bin. Read your competitor's article carefully and see if and where your data

and conclusions differ. It is unusual for the two studies to be identical. You may need to include additional data, or rewrite your manuscript to change the focus or emphasis slightly, but it's highly likely that you'll find the way to get your results published.

Reviewing papers

Start reviewing papers during your postdoc. It's common practice for a group head to delegate papers to their senior postdocs, so ensure that you get some experience of reviewing and get your boss's feedback.

- Ask your boss to acknowledge your contribution to the editor.
- Ask senior colleagues to recommend you as an alternate when they are too busy to review papers.
- Talk to editors at meetings – if they like you they may try you out, either as a fourth reviewer or in your own right.
- Be selective – you don't have to say yes to every reviewing request.
- Be fair – reviewing is about providing constructive feedback to the editor and to the authors. Remember what it feels like to receive criticism that is not explained.
- The guidelines for reviewers vary and it's important to follow the specific instructions provided by the journal you're currently reviewing for. This set of articles on peer review from Elsevier is worth a look for general advice.

And finally, you can change direction

It may be that you decide an academic career is not for you. If you've found something else you're passionate about and prefer to pursue, that's great too. Research is a weird, vocational obsession that can last a lifetime, but equally it can become less compelling as priorities and interests change. It's also a job that you can be fantastically good at but, heartbreakingly, due to factors outside your control, such as funding cuts, you may not be able to continue.

The first thing to realise is that your life as a researcher has prepared you superbly for pretty much anything that requires intellect, flexibility and the ability to grasp important facts fast. If you choose to stay in a related job, your expertise will be invaluable, and the network of contacts, friends and collaborators you've built up can be your passport to getting a head start. The world is your oyster and you should treat a decision to move on as a big opportunity.

> *"Go where the best research is and be* passionate about it. If you lose the *passion, stop doing it."*
>
> Professor Gerard Evan, FRS

Good online guides to post-research career options are unfortunately few and far between and often talking to people who've made the transition is your best option. However, this UC Berkeley resource might help with your next steps. Career websites hosted by Nature and Science are also worth a look.

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