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0521617405 - Building a Successful Career in Scientific Research: A Guide for Ph.D.  
Students and Post-docs

Phil Dee

Excerpt

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# PART I

## The first couple of years



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## 1

## Choosing and handling your Ph.D. adviser

Let's be upfront about one of science's biggest taboos: science can be unbelievably boring, especially other people's science. Doing most other people's Ph.D. or post-doc projects would simply drive many of us up the wall, so identifying your own is no trivial matter. Naturally, you become committed to your own projects partly because you know you just *have* to do the work. Hopefully, you are also genuinely interested in major aspects of your work; we all unconsciously ignore the boring bits to keep ourselves focused on the good stuff.

So an ideal start to a successful career at the 'coal-face' of human knowledge is to make sure that you pick a project that inspires you. Have you ever wondered why some people thrive on equations, whilst others are much happier staring down a microscope or trudging through the rainforest. What matters is that you identify your own little niche – somewhere you can work happily, animated by drive and passion for what you do. Finding the right project is a lot like falling in love: you might think you know what sort of person you'd go for, but that counts for nothing when your ultimate enchanter or enchantress walks in the room. Of my future partner my parents told me, 'You'll know when you know', and I have to say they were right.

Your journey of self-discovery begins when you set out to find a Ph.D. (No offence to final year undergraduates, but it's generally accepted that choice of first degree matters very little in the grand scheme of things.) I arranged a mini-tour of candidate universities when I was selecting my Ph.D. I looked at quite a lot

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of projects and, not surprisingly, found most of them totally uninspiring. When I stumbled, downhearted, into my last port of call, I knew immediately that I'd found what I'd been looking for. The place, the person, and, most of all, the project all seemed 'right'.

If you are hunting for a Ph.D., cast your net far and wide, and be open-minded. You don't have to wait for adverts to appear. Get in first before the crowds. E-mail people or get on the telephone to arrange informal lab visits. If they're impressed with you, they might not even bother with the cost and hassle of advertising the position, and they'll love you for taking the initiative. Also, you may never have known they had a vacancy at all if you hadn't been proactive and picked a few promising names from the great panoply of scientists on the Internet.

It's a mistake to apply for a particular project in response to an advert without first visiting the lab and talking to the project leader and, if possible, the rest of the team. Most labs are very welcoming, given that so few applicants bother to do it, and I am sure you will find it very helpful. Otherwise, how on earth are you going to know whether the project will drive you insane after three months? And it's not just about the techniques you'll be using, you also need to size up the lab culture. I mean, just how full on and driven are the rest of the lab members, or how laid-back is the atmosphere? There are both types of lab, and more, and, depending on your personality, any one of them could drive you crazy. Above all, choose wisely.

The same, of course, goes for your Ph.D. adviser, although the lab culture is likely to reflect his or her style. A good working relationship with your new Ph.D. boss is essential as much of your initiation into the 'real' world of science comes to you directly through them. The potential for this relationship is staggering; think about it. In the course of your Ph.D. you could have several hundred long and in-depth conversations, by phone and e-mail as well as face-to-face. Together you'll enjoy moments of exhilaration and suffer bitter disappointment.

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As in dating, there are ‘rules’ for getting the best from your scientific nearest and dearest. The first three rules lay the foundations for a successful relationship. Not surprisingly, it’s all about communication.

### **Rule 1: the ground rule: communicate with your boss**

Will your adviser maintain their interest in you even after your several years of possibly less than world-class research? The answer can definitely be yes, but only if you work at maintaining the relationship. One of the most common ways to fail your Ph.D. is to become isolated from your boss. I’ve seen this happen once and it’s not at all nice. The person in question fell out with their adviser and managed to eventually lose all contact with them – not a smart move. So, if you wish to avoid ending up working in the local supermarket, maintain at least a reasonable relationship with your boss so you can submit your thesis. Keeping them on board for the long haul also keeps you tapped into their scientific ‘street knowledge’ and their network of contacts. These vastly improve your job-hunting prospects. Your boss offered you the Ph.D., so they must have rated you. Without becoming a lap dog, aim to work at keeping them pleased that they chose you.

### **Rule 2: keep your boss informed**

As you increase in confidence, you’ll naturally drift free from the burden of checking everything with your boss before you do it. But, beware of a potential slippery slope, especially if your boss is geographically distant from you. Sometimes you can go for days, weeks, or even months, without your boss knowing what you’ve been up to. What’s more, even if you are a workaholic like me, the subconscious temptation is to let things slip when your boss is out of town. This nasty habit can lead to a false sense of independence (‘I’ve got plenty of time and I’m in control’) and a boss with a false sense of security (‘I’ve not heard

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anything from them so I assume everything is OK'). Regularly feed information to your boss, if only by e-mail, to focus your mind on exactly how much, or how little, you have achieved since the last time you told them anything. Schedule this event once a week to give you a regular, and scary, target to aim for. There's no fear like the fear of admitting, 'I haven't achieved (or even worse 'done') anything at all since last week.' Applying this rule is a discipline that leads to happier students ('Regularly telling my boss what I've achieved seems to be really driving my project forward') and happier bosses ('I don't have to hope they are making progress, I know they are'). Establish this dialogue early in your relationship and you'll reap the benefits by pushing your project forwards faster.

**Rule 3: discover what makes your boss tick**

To get this new relationship working really efficiently, you'll need to find out which sort of scientific animal you are dealing with. Underneath a scientist's often quiet exterior lies constant mental activity. But is your boss an aggressive activist, who is always looking for their next experimental 'fix', or a more cautious completer-finisher, who only moves on to the next level when everything else is in place? Find out which of these, or the many other personality types, they are. By all means chat discretely with any 'old-hands' in the lab to assess their dealings with your boss, but the real meat of Rule 3 is subtle in the extreme - it's about your ability to communicate with the head honcho in their language. I learnt, to my cost, that I could utterly confuse my boss unless I chose my words very carefully. I'm still not clear how 'I don't think that experiment is worth repeating' sounds like 'I'll do it again straight away', but in time I learnt how to phrase things so they were crystal clear, a sort of 'boss-speak' I suppose. In effect, you'll need to identify where your personality and communication skills are at odds with your boss's and take steps to iron out the differences. As the

6 student, the onus is on you to do this, not on them. Finally, do

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not make the mistake of underestimating your boss. After all, group leaders have made a successful career out of drilling for oil in nature's uncharted depths so give them a bit of respect and take time to scratch the surface.

Rules 4 through 6 propel you into a more dynamic student – boss relationship.

**Rule 4: earn your boss's respect**

Being lazy, unreliable or just plain obnoxious will not earn your boss's respect. But the most common problem for Ph.D. students is a lack of confidence. I once knew a capable student who used to kow-tow habitually to his boss's ideas simply because he lacked the conviction to believe in his own. This boss was equally frustrated by this student's lack of initiative. Earning your boss's respect doesn't only come from amassing lots of good results, important as they are; in science, it's all about showing you are capable of independent thought. So don't hamper your chances of career progression by either not believing in your ideas or lacking the bottle to speak up. Develop the knack of approaching your boss with good hypotheses and suggestions. Rule 4 is not about trying to 'sell' your boss every idea that comes into your head. They'll soon get tired of you. Why? Because we are all human and very few of us have really good ideas more than once a fortnight (see Chapter 16). So be prepared to hold your tongue and wait until you know deep down inside that you've got something good.

**Rule 5: assert yourself**

Many students are not used to making demands of people in positions of authority and can be far too submissive. If you apply Rule 4 you have the immediate advantage of being in a much stronger bargaining position: your boss respects you for your ideas. But remember that you are being trained to be an independent research scientist. So forget the old-fashioned student – teacher relationship, this is something new. When

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appropriate criticise their rationale and argue your case. Stand your ground with your boss and you'll boost your confidence for when you have to stand your ground in front of a packed conference hall. Without being hardheaded for the sake of it, negotiate with your boss about your project aims, your workload, anything. If you are new to tackling bosses, don't be too pushy. Get yourself on an assertiveness training course. This will show you how to listen to your boss, then use what they say to approach them in a way that will increase the chance of a successful outcome: you'll get what you need. If you are assertive in the true sense of the word, your boss will feel that they got what they wanted too.

**Rule 6, the golden rule: write for your boss**

The golden rule is obvious. If you want an easy ride with your boss, you have to be proactive about writing, especially writing papers (see Chapter 6). They applied for the funding and brought you in primarily to increase their own personal tally of papers. That's what everyone is judged on in science. Ultimately, that's what your boss hopes for from your project. If your boss already respects you and is used to you behaving assertively, early delivery of good-quality writing will utterly convince them that you are worth investing even more of their time in. So, as soon as your results are in, start collating them all together electronically.

Daunting as it may seem at first, you can write the draft outline of a paper within a week, if you put your mind to it. When I handed my boss the best part of my first paper, he was like a dog with two tails: I had a great working relationship with my Ph.D. boss, but I had never experienced this level of interest in my work before. Clearly nothing gets a scientist's attention like the prospect of submitting another paper with their name on it.

8 The golden rule (Rule 6) is the hardest to apply, but has the most wonderful effects. First, your boss will love you and gladly

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read several drafts of your thesis. Second, writing and defending your thesis will be a whole lot easier with at least some of your work submitted for publication (see Chapter 6).

So there's your complete six-step guide to becoming a good 'boss-handler'. Follow these rules and you'll be more likely to find yourself with a boss who is also your greatest ally.

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# 2

## Motivation, time management, and multitasking

Assuming you don't already know, sit down and work out your own personal reasons for putting yourself through a Ph.D. Once you discover what your true motives are, however trivial, never forget them. It may be a simple desire to see the title 'Dr' on a letter addressed to you. No matter. When you are up against it, it's that motive which will keep you going.

But, how do you translate this personal goal into a successful project? Scan a few job ads and you'll notice that the requirement 'self-starter' pops up with surprising regularity. To have any hope of completing your Ph.D. within your allotted number of years, you need to have this quality in abundance. First, you need the self-discipline to plan your days, weeks, and months yourself. Second, you have to motivate yourself to stick to your plan for the long haul.

Here are a few strategies that help to maintain momentum.

### **The daily grind**

Most Ph.D. projects begin with an easy experiment that stands a good chance of working. This is a good model for the working day: start each day with a simple task. Doing something straightforward first thing gives your brain time to come online and builds your confidence if you can't face diving straight into a tricky experiment. However, once you've 'woken up' don't delay getting stuck-in; displacement activities can easily sneak in and fill up your entire day. You may convince yourself that you need to scan the recent journals in the library or tidy your bench, but,

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if you have writing or experiments that need facing up to, then face up to them you must.

It helps if you can build some mental breathing space into your day. Time spent reflecting on your work is just as important as time spent actually working. A 15-minute walk can do wonders for your brain's oxygen levels, and it's often when real inspiration comes.

Try to finish each day with a positive outlook. If you're lucky, your day will end with a good result or a fresh new idea. This gives you an immediate boost the following morning. But, the end of the day is perhaps the worst time to push your luck. The law of averages is set against too many experiments working perfectly first time.

Your worst enemy is fatigue. It lowers your efficiency and makes you more prone to errors, and that's when self-doubt creeps in. So, when you're getting too tired, for goodness sake go home. And, if you can, try to make your home a place of respite from work. If you wake up in the morning to see a pile of unread papers bearing down on you from the bedside table, you'll soon feel that you've had a skinful of your Ph.D.

Of course, if you find yourself truly on a roll, you may wish to shelve the normal habit of quitting while you're ahead. After all, you never know how long the results will continue to flow in. It's certainly a rare treat to watch everything you touch turn to gold! Unfortunately, you can't plan for these work fests; they just happen when you least expect them! If late in the day your work does start to go wrong, change over to something that stands a better chance of letting you end on a high. Even if you only manage to plan or prepare for the next day's experiments, you'll get the sense of achievement you need. The golden rule is do something, anything, as long as it contributes to both your project and your sense of positivity. Always spend a few minutes at the end of the day plotting out the next day's work. Write it down.