

Chapter 1

Choosing a Research Group: Pluses and Pitfalls

Nothing great was ever achieved without enthusiasm.

– Ralph Waldo Emerson

Before you even get started on your PhD research, you will have already made a decision that will have a major impact on the success of your project, and perhaps even on your future career: you have chosen to work in a particular research group, under the guidance of a particular thesis advisor or supervisor.

While making this choice, you most likely spent a great deal of time thinking about your research project. You addressed questions such as: do I want to continue the type of research I did for my senior thesis/Masters degree, or do I want to explore a new field? Do I prefer doing experiments in the lab or do I feel more comfortable with a theoretical approach? No doubt that you've had to think long and hard about all these personal preferences.

However, there is one more success factor for a productive and pleasant research period: the group you're working in. Think of your team as being on an island together in the most basic social unit of scientific research – science's nuclear family – the

research group. For the next few years you'll be 'stranded' with this particular group of people – like it or not.

Every research group has its own unique chemistry – its own group dynamics. There are, nonetheless, some patterns to be aware of. It can be helpful to consider which type of group you're likely to be most comfortable in. Sure, you need to choose a group that does the science you want to do, but other factors like the size and nature of the group are also important. Reflect on the others who live on your little research island and what each of them is likely to contribute to the group effort – and your own research.

In this chapter we describe five archetypal research groups, ranging from a small group with a starting (assistant) professor as a supervisor, to a huge group led by a senior (full) professor. We discuss typical advantages and disadvantages of different types of groups. Include these considerations before you make a final choice. If you have already made your decision, you will be ahead of the game by being aware of some of the advantages and pitfalls of the type of group you're working in.

The Start-Up Group

Let's say you've joined a new group headed by a young assistant professor.¹ In this scenario you'll belong to the first generation of PhD students and your advisor will likely be full of energy and

¹In this chapter we use terminology from the US academic world to describe academic ranks: assistant, associate and full professor. Each country has its own academic system with its own nomenclature. However, the career paths are similar. After completing a post-doctoral fellowship, one starts with a small (sub) group, as an assistant professor (in the US). In about 5 years the group grows in size, and the supervisor is promoted to associate professor. When the group matures and reaches the status of a completely independent

eager for data – data that you will have to acquire. *Caveat emptor*: young thesis advisors have the tendency to design overly ambitious research programmes. Plans may have to be simplified when reality sets in. In such a small group you will have frequent and intensive interactions with your advisor, particularly because his or her career will depend on the success of the first generation of graduate students – you. The lack of experience of assistant professors in supervising students is usually compensated by the enormous amount of time they spend with their small group. Moreover, your advisor will often have fewer teaching and administrative duties. More time, therefore, can be devoted to working in the lab. Full of exciting new ideas, a starting professor often operates more like a more senior partner than a boss. On the down side, there is the pressure to get tenured, and management and interpersonal skills don't come naturally to everyone.

In such a setting it is crucial that you get along well with your advisor, so it's a wise idea to invest in that relationship. If there is no common ground and enthusiasm for your project, your life in the lab is bound to be rocky.

In a start-up group there will probably be just one or two other PhD students or Post-docs. The success of your projects will naturally be intertwined. The equipment and apparatus you'll need to acquire data will probably have to be constructed or set up. Lacking the infrastructure of an existing group, all of you will probably spend a lot of energy in building equipment, designing new models or writing new computer codes. Make a good and fair arrangement with your colleagues on how to share the output once it's time to harvest the data. Agreeing upfront on the order of authors' names on papers, for example, will prevent

academic group, the supervisor is usually (but not always) granted academic tenure and promoted to full professor.

conflicts once the results start rolling in. Although this issue is relevant in any group, it surfaces often in start-up groups. These groups still lack clear publishing policies, while the output to be shared can be limited for the first generation students.

How can you tell if a new group leader has her act together and if you're likely to make a success of your time there? After all, your young professor has no track record in guiding a group. Although no success is guaranteed, we have two suggestions that might help you to find out. First of all, consider your job application as a selection process that works both ways, the professor looking for the best possible student and you searching for a group that suits you. Second, try to find out how the professor functioned as a Post-doc in previous job. Was she already responsible for setting up new experiments and acting as a professor-to-be, or was she still working like a senior PhD student, acquiring data independently and executing suggestions effectively, but not doing more than that?

The 'Up-and-Running' Group

Around the time an assistant professor has delivered the first generation of PhD students into the world, he is usually promoted to the rank of associate professor. The new associate professor's initial research has made some impact on the scientific community, and as a result, grant money is easier to come by and the group is able to expand. The investments made by the first generation of PhD students are starting to pay off. It may seem much easier for the second generation of students to do good research because the environment is so much more conducive. But usually the more established thesis advisor spends less time on research, since he/she is invited to give more lectures and to attend more conferences. Also, invitations to all kinds of committees are

eagerly accepted. How well the associate professor copes with this transition will depend on his organizational skills.

As a graduate student, you will have to work much more with your fellow researchers. Guidance from your thesis advisor will be less frequent (as she may be less in touch with day-to-day activities in the lab) and perhaps less astute than in the start-up group. Accept this reduced interaction with your advisor as a fact of life; after all, the ability to work well independently is a key career skill. Discuss how the two of you can have effective interactions when you *do* get together. You may have to make an appointment with your advisor to discuss progress on your research. This may be tricky as your thesis advisor may not yet be used to scheduling discussions which previously were spontaneous. In such a growing group it is as important to get along with your fellow graduate students as with your advisor. Students nearing the end of their studies can be a great help in kick-starting your research project (provided they have time and are willing). Be honest with them about your needs. In exchange for their help you might offer to help them wrap up any remaining experiments for their thesis.

The Small-but-Established Group

Having been a successful associate professor for several years, an academic scientist will usually be promoted to the position of full professor. With the rank of full professor and the hurdle of tenure cleared, their job is secure. Some professors feel they are finally able to relax after many years of hard work. They may become more interested in the administrative aspects of running a research group, and their interest in academic research may start to fade. They have enough experience to keep a small group going, and still periodically have decent or even great results to

publish. When you are enrolled in such a steady but small group, you may have to work extra hard to generate enthusiasm for your project. Although such a group can get you a degree, a valuable asset in your future career outside academia, it is not always the best place to start an academic career.

Interactions with your advisor may be infrequent. Proper planning of appointments with your advisor is crucial under these circumstances. You not only have to plan these meetings but also prepare for them. Make a small agenda of things you want to discuss, and have your results ready in a presentable form. You probably can expect more interaction and support from fellow grad students and Post-docs, even if they work on another subject.

But not all small and established groups fit the description above. Plenty of full professors enjoy doing science so much that they remain deeply involved in the research at all times. They may choose to focus their attention on a small research group with just a couple of PhD students – and try to avoid administrative tasks as much as possible. These small enclaves of pure and intensive research can be wonderful and stimulating places for graduate student work. If you get along well with the professor and your fellow PhD students, you will thrive in this type of intensive environment. Your investment in group interactions will be repaid generously: this can be a fruitful setting to have a productive and enjoyable time as a PhD student.

The Empire

Some successful professors allow their group to expand to immense proportions. Such groups can easily have 10–20 PhD students or more, along with several Post-docs. A good fraction of all PhD students work in such groups. Life for them is

usually not bad at all, despite the fact that interactions with their ‘famous’ professor may be scarce to non-existent. Guidance comes from Post-docs in the group and more senior PhD students.

Not every topic investigated in those large groups will be a winner and some will fail altogether. But the availability of sophisticated instrumentation and a vast skill base should enable you to acquire data quickly. If your project fails, there are other projects you can fall back on. More than in any other group, interaction with your peers will determine your success and the amount of pleasure you get from your PhD research. Since there is a whole army of young researchers, you have the luxury of finding a few fellow students – and more senior scientists – with whom you click. You may even decide to work on a series of projects and share the results. Finally, be prepared for an infrequent interaction with your famous professor. When she/he happens to drop by the lab, be prepared so you get the most out of it.

Unfortunately, in some of these empires there may be a highly competitive and cut-throat atmosphere. During your introduction to the group, and certainly before you commit to working there as a PhD student, you should be alert to any lack of camaraderie and spirit of cooperation.

In some European countries, such as Germany, the full professors seem to run such empires. In reality the professor often has a few lieutenants running smaller sub-groups. When you work in such a smaller sub group, the dynamics usually resemble those of a start-up group or an up-and-running group.

The Gardener

Once a good scientist, this late-career researcher’s interest has waned. With his vast intellectual resources engaged in pursuits that most people only dabble in, he has developed into

an extraordinary gardener (or birdwatcher, or cook). He still maintains a research group – he even managed to get his grant renewed the last time – but any good work that comes out of his lab is a result of the efforts of collaborators who haven't yet discovered that his best years are behind him – or the occasional talented student or Post-doc who has the misfortune to wander through, not having heard word of his scientific demise.

If you're not sure what you want to do with your life, or have a couple of years to kill, a stint in a lab like this can be just the thing. Just don't expect it to be an easy start of a career in science.

Surviving in a Non-supportive Group

If you haven't yet chosen a research group, it's a good idea to give some thought to which kind of group you're more likely to function best in; how well you get on with your colleagues and advisor will have a big impact on how well you perform during – and after – your PhD project. You need to find a group that does the kind of science you're interested in, but also one that fits your personality.

Unfortunately, that's not a very easy thing for most of us to figure out. So much depends on the particular people in the lab – and, especially, the person who runs it. You may think you're likely to thrive in a small group, only to find yourself very happy in a large one. It's very easy to make a mistake. If you do – and even if you don't – there are likely to be times when you struggle with group chemistry, or when you feel you aren't getting the support you need. Here's how to get the most out of such a situation:

1. *Think positively.* Focus on the support that is available rather than sitting in isolation, frustrated about the support you're not getting or blaming those who should be helping you. Use this time as an opportunity to develop some independence.
2. *Find the help you need.* No member of the group, including your advisor, can solve all your problems and fulfill all your needs. Some colleagues and advisors are better at designing new projects, others at debugging computer codes, still others at editing manuscripts. So search around, and don't limit yourself to your research group; you might be, metaphorically, stranded on an island with these folks, but you do have a cell phone and a fast Internet connection. Don't share pre-publication data without your advisors permission, but find the help you need where it exists, whether it's within or from outside your group.
3. *Identify your show-stoppers.* It's not necessary to solve all of your problems in order to make progress, at least not all at once. Set priorities; address the most important issues first. If you notice that you're spending a lot of time on problems that seem pressing but, in a careful analysis, don't seem all that important. Focus only on those problems that really stop you from making progress with your project.

If none of the above suggestions works, and you find yourself envying other students who seem to work in a much more productive and pleasant group, it might cross your mind to change labs. This is a delicate issue that we will not discuss here in full detail. A few tips: double check how much greener the pastures are over there (is it really worth it to change?); identify the procedures at your university (is changing labs common practice, or are you considering doing something that is unheard of?); finally, good diplomacy might make such a move more likely to be successful.

In summary, the type of group you work in can determine, to a large extent, the way you work, as well as the type and frequency of interaction you have with your advisor. Your success will be influenced not only by having a good advisor (or a professor with a famous name), but also by your relationships with the other PhD students and Post-docs in the lab. So try to evaluate the dynamics of the group you're in and identify your allies. Putting some effort into these relationships will help make your research projects effective and pleasant.



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