

How to Do Great Research

Grad school survival advice from Nick Feamster and Alex Gray

Managing Your Advisor

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With the new academic term almost upon us, several of my students started to put together a list of practical advice for incoming students—including various niceties such as how to gain access to the lab, how to get accounts, how to submit reimbursements, and so forth. I wanted to contribute to the list of advice, and I figured I could offer some value by giving advice to new students about how to gain traction on their research as quickly as possible. This post is the first in a series of a few posts on that topic; in this post, I will cover the topic of *managing your advisor*.

The notion of an advisor is an interesting concept for many new Ph.D. students. Incoming graduate students typically have one of two backgrounds: some come straight from undergraduate studies (and, hence, may have never had a manager or a boss overseeing their career); others have spent some time in the workforce and have decided to return to the university and begin a career in research (and, hence, have some notion of what it is like to have a manager). An advisor-student relationship is unique, though, and will be a new experience for both types of incoming students. The relationship is similar to a manager relationship, but has several differentiating features. First, your advisor is often a collaborator on equal footing. Although an incoming Ph.D. student is not (yet) a peer of his or her advisor, the goal is that by the end of the Ph.D. process, the student and advisor will be peers. In this sense, the Ph.D. is a true apprenticeship. My students don't work *for* me; they work *with* me. Second, your advisor is *not* a manager in the strict sense, but is literally an advisor: You are in control of shaping your own graduate career, from what you choose to work on to who you work with. Your advisor should be a catalyst and facilitator for your success and should not be treating you as an employee or "hired labor". Although some research contracts have deliverables, you should be suspicious of any advisor who wants to constantly hold you to tight deliverables, as it will constrain your autonomy and creativity; that type of advisor will ultimately be more like a manager, and you can find plenty of managers in industry who will pay you a much higher salary. If you find that your advisor is bossing you around or restricting your autonomy or creativity, change advisors as soon as possible.

In any advisor or managerial context, it is important to recognize the importance of "managing up". While there may be strategic reasons to do this in any context, the most important reason to learn how to manage your advisor is to **make the most of your graduate career**. Many things compete for your advisor's attention—papers, grants, proposals, teaching, committees, other students, outside

opportunities, etc. At the same time, everyone's Ph.D. experience is unique, and it is incumbent on you to work with your advisor to help you define your own trajectory and also to create a working relationship that works for both of you.

In my seven years as an advisor, I have learned a few things about my working style. Here is some of the advice I have offered my students about how to manage me. Many of these tips may be useful in general for other Ph.D. students who want to help build a better relationship with their advisor and help get the most out of their graduate careers:

- **Ask your advisor for what you need.** Want to attend a conference, get an introduction to a senior colleague in the field, buy a book or other equipment, find an internship, get a travel grant, or something else? *Be proactive.* The answer will be "yes" more often than you think .
- **Scheduling meetings.** I have a Google calendar that I share with all of my students. If a meeting or event is not on my calendar, the student should assume that the meeting is not happening, even if the meeting has been discussed (and agreed on!) in the hallway. There is no way to keep track of hallway discussions for scheduling and they are quickly forgotten. Though it's not strictly necessary, I advise my students to consider sending a reminder/minutes/confirmation before the meeting; this relates to the point below on making meetings count. Scheduling meetings sometimes can generate an explosion of email—this is a recipe for disaster and ensuring that you never get to meet your advisor (see below on email); if scheduling is proceeding slowly, limit the email thread to 1-2 emails before suggesting a meeting invitation by Google calendar. If all else fails, send a meeting invitation during an open slot; in the worst case, your advisor will react by moving it to a time that works (it is on the calendar and thus can no longer be deferred indefinitely).
- **Try to meet your advisor once a week, even if you *think* you have nothing to talk about.** Make an effort to schedule a meeting once a week, even if the meeting is short; in my experience, I have found that sometimes even a ten-minute meeting with a student can make a huge difference for working around a mental block or changing an approach to a problem. Do not assume that a meeting cannot happen simply because your advisor is not in town. Short meetings by Google hangout are often very handy. In fact, throughout the summer of 2013, I was rarely at Georgia Tech; many of my students actually found it *easier* to meet me when I was traveling because I wasn't being constantly bombarded by things related to the daily drumbeat at the university (*e.g.*, committee meetings, interruptions from admins, teaching, etc.). Consider having a meeting even if you think there's nothing to report. You may find you are stuck in a rathole, and you may not even realize it. You should be particularly worried if you have spent 2-3 weeks "debugging" or on some "implementation" without getting any feedback. Chances are, you are ratholing on something that probably isn't getting you any closer to a publication. Seek help immediately!
- **Attend every single group meeting.** Do not miss group meetings. These are one of the most important structural elements of your graduate career that actually relates to your research. Group meetings are important for several reasons: (1) You learn about what others in the group are doing, which may be a useful resource (or, you may find out you can be a resource to someone else). This all helps with collaborating across the group. (2) You find out what your advisor has been up to and why he or she has not been replying to your emails immediately. (3) You can quickly identify if you need to have a longer meeting with your advisor, with other students in the group, etc. This can be a huge timesaver. (4) Group meetings mark the passage of time. It is useful to hold yourself accountable and make sure that weeks and months don't slip away without progress. I have group

meetings with my students three times a week; initially, I thought that this might be excessive, but it turns out to work pretty well. Three short group meetings can often be a lot better than one extended group meeting. I will expand on this more in a later post.

- **If you need more of your advisor's time, ask for it.** Students are often confused or concerned that an advisor spends more time with some students than with others and may even (wrongly) think that the advisor is either less excited about a particular project or (worse) doesn't like some students as much as others. (I remember comparing notes with my fellow Ph.D. students in grad school about how much time our advisor was spending with each of us.) Yet, it is important to remember that good advisors don't play favorites. The time that an advisor spends with a student (or on a project) is typically determined by the advisor's perception of how much time is needed; the required time can vary dramatically according to both the stage of the project and the stage of the student's development. Students who are early in their careers typically need (and should be asking for) a lot of guidance and "closed loop" feedback. Students who are close to graduating also tend to need more attention of a different sort—help with building their professional network, seeking out job prospects, practicing job talks, and generally landing on their feet. Similarly, nascent research projects or projects with substantial coordination components (e.g., large systems-building efforts) often need a lot of advisor attention, since they have lots of moving parts and can involve coordination between multiple sub-projects and students. Do not be overly concerned about strict time accounting. If you feel you need more time, simply ask for it—or, better yet, just try to take more time (walk into your advisor's office, approach him or her on IM, send regular email updates... whatever it takes). Advisors tend to spend more time with students who demand more of their time.
- **Keep your emails short and to the point.** Here is a simple rule of thumb: If the email is longer than one paragraph, it probably won't get read right away, particularly if there is no summary at the beginning of it. It almost certainly won't get an immediate response. Additionally, consider whether email is the fastest way to resolve something, or whether it's quicker to have a 5-10 minute meeting, hangout, IM chat, phone call, or whatever. Use the right communication mode for the job.
- **Do not assume that if your email doesn't get a reply, it hasn't been read.** I read everything in my inbox, almost always on the same day that it arrives. Unfortunately, I also receive 300-500 emails per day *in my inbox* (not mailing lists), many of which are actionable. Suppose that half of those emails required action, and that each one required one minute to process and respond to—that's already six or seven hours a day just to process email. That is insane and can kill anyone's productivity. I am convinced that it is possible for a professor to do nothing else in life except reply to email. To control this insanity, I often process emails "in batch mode"—leaving email to (mostly) pile up for a few days and then responding to a bunch at once. I tell my students that if they do not receive a reply right away, "retransmission" after a few days is fine. I do not consider this to be rude, nagging, or pestering behavior; most likely I have simply just forgotten (I have found that it's surprisingly difficult to even keep a to do list for all of these things that students ask professors to do, as doing so becomes a monster mega-task in and of itself). Before sending a retransmission (or initial email), however, consider whether you have chosen the best medium for your message. Sometimes an in-person meeting or IM follow up to an email will get the response you want/need.
- **Make the meetings count.** Many meetings are wasted by not asking yourself simple "does this make sense?" questions before presenting a plot/result. I ask my students to read Jon Bentley's "**Programming Pearls**", particularly **the chapter on back of the envelope calculations**. Also, I advise my students to read Vern Paxson's "**Strategies for Sound Internet Measurement**". Your advisor has almost certainly seen a ton of plots/experiments/data and is pretty good at quickly

determining whether a graph that you spent two days producing makes any sense at all. You can have a more productive meeting if you do some simple debugging of plots before hand. On this note, bringing specific, concrete things that your advisor can react to is helpful. "I ran some experiments and things seem to look OK." is a report I have heard many times from students. Such a report is utterly useless. Even if it were true (often things may not be OK), it is impossible to give feedback on or brainstorm based on vague statements. You are likely to get a "sounds good!" in response, which is equally useless for you. Bring something concrete to discuss. You can present anything: A performance number, a paragraph of writing, a plot, ... something to react to and figure out next steps. Even a plot that appears buggy or inexplicable is sometimes a good topic for a meeting, too, presuming you've recognized the discrepancies and can't figure out the problem. Sometimes what appears to be a bug might in fact be an interesting artifact, or even the spark for a new paper or discovery.

- **Take notes and organize them.** The students who make the best use of meetings tend to have: (1) an agenda beforehand; (2) minutes afterwards; (3) something focused and concrete to discuss/think about/talk about; (4) a consolidated place to keep minutes. Your advisor can read these minutes to prepare for the upcoming meeting, think about problems offline, review/think about the problem outside of meetings, and guide progress. Sometimes your advisor may take notes, sometimes not. Don't count on it. Even if your advisor is taking notes, your notes will complement and fill in gaps. Different people remember different things. Taking notes is also an important opportunity to practice writing—and students need to practice writing at every opportunity (more on that in a later post).
- **Do not wait until the last minute to write your paper.** Most graduate students are working on one or at most two papers or projects at any given time. It can thus be easy to overlook the fact that your advisor is involved in many more things (albeit at a higher level) and, from a purely practical standpoint, might be submitting two or three papers to the same conference deadline. Thus, waiting until the last minute to write a paper draft (or complete a project) is an invitation for scattered, distracted, and superficial feedback (and severely diminished chances of a strong paper submission). Can you write a good paper or think clearly while doing four things at once? If not, consider your poor advisor, whose aging brain is no longer as agile as yours. Write early, write often. Writing is not a task that happens after the research is done; rather, it is part of the research and thinking process, not something that is done when the research is done. Writing is part of the research. I ask my students to have a *complete* paper draft at least one week before the deadline. Nobody ever follows this advice, and I think that we can recognize that it is idealistic. I've periodically threatened to ban paper submissions if there is no draft a week before; I don't have the will to do that, although I know at least one of my collaborators who enforces this rule. Still, the point remains: early attention == focused attention == good attention.
- **Do not ask for a recommendation letter with less than one week's notice.** A letter takes at least an hour to write—longer if there is no earlier draft from another instance. Short notice makes for letters that will probably not be as strong as they could be, because a good letter takes time to polish. Consider writing the first draft yourself, or at least putting some points into bullet form or providing an up-to-date CV, for quick reference. All of this stuff makes the letter stronger and easier to write.

This list is mostly based on tips and tricks that I have found work for me. I refined this list of advice after a discussion with **Professor Jennifer Rexford**, who is also **full of useful advice**. Jen's **advice for new graduate students** is particularly useful; I am in strong agreement with her thoughts on the benefits of regularly coming to the lab and integrating with a research group. I'm interested to hear what other

tips and tricks people have for managing their advisor(s), or thoughts from other faculty members about tips they find that work well. In the coming weeks and months, I will follow up with specific posts on advice for writing, preparing talks, and managing time.

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