It's a Big World

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Throughout undergraduate and graduate school, a postdoc, and my first few years in a tenure track position, I had never considered anything other than a career in academic mathematics. The reasons for my eventual decision to join Google as a software engineer are complex, but the process taught me a great deal about both the professional world outside academia and by contrast about the quirks of academia that were biasing how I approached it. Academia is a small world, and when you spend all your time in a small world, it's easy to ignore or forget just how big a big world can be. There are a number of things that are easy and seamless in a small world that you need to be much more intentional about in a big world. In this essay, I want to describe three particular ways in which academic math is a small world and how non-academic job seekers need to adjust to compensate for the larger world.

There's only one job in academic math

When I've talked to grad students and postdocs who are looking at non-academic careers, the biggest trap I've seen them fall into is to fixate on the first interesting-sounding direction, or the job that one friend does and seems happy doing. In academic math we don't think much about different career tracks because there's essentially just one track with different amounts of energy devoted to teaching, research, and service. There are differences between teaching at a community college, a liberal arts college, or a research university. There are differences between being a grad student, a lecturer, a postdoc, or a tenure-track professor. There are differences in how faculty members interact within different departments and varying degrees of function or disfunction. But these differences are all variations on a single family of jobs, a family that looks very narrow when viewed from outside.

In the private sector, there is an unlimited variety of jobs, team/company dynamics, and career paths. Even the same job title at two different companies can mean vastly different things. Recognizing all the ways that jobs and careers can vary gives you the opportunity to evaluate what you really want, and recognize that what you want can change over time. What balance between work and personal/family time do you want? Do you want to be able to do more focused technical work or to influence the high-level direction of a team? How directly do you want to control the external impact of your work?

Questions like these are good to ask yourself regularly. There's flexibility along all these axes within an academic career, but the narrow range makes it easier to assess and compare different options. To do a comparable assessment outside of academia, you would need to investigate an order of magnitude more options. But coming from academic math where you're used to thinking about a narrow family of jobs, it's easy to think you've explored all the relevant options before you get to the one that best suits you. So while you can never explore all the options outside academia, it's important to be intentional about widening your search as much as possible before you begin to narrow it down.

Three degrees of separation

It is an exaggeration to say that everyone in academic mathematics knows everyone else, but only a slight exaggeration. By the time you've been working in a field for a few years, you will have met many of the mathematicians in that field at conferences, and read papers by most of the rest. There's probably someone in your own department who knows someone at any other university in the country, and their acquaintance will know all of the faculty and most of the graduate students there. So even if you have a high Erdős

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number, if you go by who knows whom you can probably get to any other academic mathematician in three jumps.

Many people inside and outside of academia find the idea of networking distasteful because they think of it as trading favors with people you only pretend to like. But it really means making personal connections that make it easier to communicate. Whenever you meet other mathematicians and tell them about your latest theorem, you're networking. All the lemmas you hear that haven't been published yet, the vague but valuable intuition that never will be published, come from networking. The academic math community is such a dense network that we barely recognize it as one.

Outside academia, social networks are similarly the most effective means of learning information that hasn't been or never will be written down. People outside academia enjoy sharing what they know just as much as we mathematicians do, particularly if they know it's helping someone else. The best way to learn about a particular career is to talk to someone doing it. The best way to learn about a company is to ask someone who works there. The best way to make a decision you've never faced before is to ask advice from someone who has. What you'll learn isn't secrets; it's information that large-scale communication is not suited to.

Social networks outside academia are large and sparse, which makes it harder to find the people with the information you need. In academic math, the very nature of doing mathematics puts you in contact with the people who know what you will need to learn. And the ones you haven't met have their email addresses on easily findable department web pages. Outside of such a tightly knit network, you have to be much more intentional about meeting and keeping in touch with people who can share the information you'll need, or connect you to others who can. That's why non-academics carry business cards and send Linkedin invitations.

One factor that has been identified as contributing to a lack of diversity in many fields is that people tend to default to networking with others with similar backgrounds. Because these networks affect the flow of information about careers and job opportunities, as well as occasional favors, they reinforce disproportionate representation. By being intentional about how you network, you can fight these tendencies and look for more diverse connections.

It may feel odd asking an acquaintance to introduce you to someone they know, then asking that person to answer some questions about their experience. But outside academia those sorts of requests are not uncommon, because it's the best way to share and spread information. And as you gain experience, you can do the same for others.

In academia, you are your expertise

Academic departments typically hire for one or a small number of positions at a time, which means explicitly comparing applicants against one another. So to get an academic job, particularly a tenure-track job, it isn't enough to be a competent, qualified mathematician; you need to stand out compared to all the other applicants based on your expertise in research and/or teaching. And because faculty jobs often have implicit or explicit restrictions on research field, the subject of your research can have as much or more impact than the quality of your papers.

This emphasis on expertise and direct competition makes it difficult to distinguish your work from yourself, which in turn makes work/life balance much harder to maintain. Outside academia there are some jobs that have similar dynamics, but there are also many that don't. In software engineering and data science, for example, the number of open positions typically far outpaces the number of applicants that meet the minimum bar that companies are looking for. This minimum bar is very high, but competing against even a high bar is very different from competing against other applicants.

Many non-academic jobs involve working on a team in which responsibilities rotate between multiple people who are all capable of doing the work. Anyone on the team can take a sick day or go on parental leave without shutting everything down, and being the sole expert on something isn't necessary, or even desired.

If you're switching to a non-academic job, you won't initially be an expert in that job since you've never done it before. Just like when you started graduate school, starting a non-academic job means being overwhelmed with a seemingly endless body of information that you need to learn in a hurry. Employers want to know that you're ready for this, so the ability to learn and adapt will be much more important than knowledge you already have.

This is one area where having gone to graduate school in any field is an advantage; it shows that you can handle the situation. However, you also have to fight your instinct to play the expert. You can't learn something new until you admit you don't know it, and you won't get hired if the employer thinks you haven't figured this out. You should learn as much as you can about a job before you apply, but there will always be things you can only learn from experience. Because you're competing against a bar rather than other applicants, you'll often be judged by your potential to learn rather than what you know today. So when you're applying for a non-academic job, it's important to be completely transparent about what you don't know, and how interested you are to learn.