

# The Job Hunt: A Bit of Advice Off the Beaten Path

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## 1 Introduction

In the spring of 2019 it started becoming evident that I would be graduating in the summer of 2020 with my doctorate in mathematics. One of the first things I did was ask PhD students who were graduating in the summer of 2019 how they would advise their former selves, if they could go back in time, to better prepare for the job market. The responses I received included the following:

- Start early! There are a lot of documents to write and everything takes longer than you expect it to take, even when taking this fact into account. I have found this advice to be exceptionally sound. You should start writing your documents in early summer for applications you plan to submit in the fall.
- Late offers come. After the landscape settles, some places haven't found a good candidate to accept the position and, possibly quite late, might offer you a good position. I have not yet reached this phase but have heard this is true.

Now, there is a lot of standard advise about entering the job market and preparing your documents, certainly enough to write a whole book. The point of this article is not to rehash the most common advise, but rather to elaborate on a few particulars that “fell through the cracks” when I was applying for jobs. I frequently felt lost, overwhelmed, and often times thought to myself “why didn't anyone tell me this?”. As memories of an experience fade with time, I find that it is best to write these comments down while they are fresh on my

mind in the hopes of assisting future applicants. These thoughts are written stream-of-consciousness and are by no means an exhaustive list of things you should know.

To start, I highly recommend two references. These include the website *theprofessorisin.com* and the early career columns in the *Notices*, a monthly publication of the American Mathematical Society (AMS). If you are a math PhD student, you should be able to get a free membership with the AMS through your institution and somewhere on their website you can opt-in to receive a monthly physical copy. The early career columns are in sync with the application process and I personally have found them helpful.

The job application process bifurcates into two major categories: academia and B.I.G. jobs. B.I.G. stands for Business, Industry, Government. Furthermore, academia bifurcates into teaching positions and research positions. Many people I know jump straight for the research positions and don't even bother with the B.I.G. or teaching positions. This brings me to my first word of advice. Be humble. A job you currently think you would never do might just be the best fit for you. Don't rule out places or opportunities because your background doesn't completely match the job description or because they are "beneath you". Be humble.

Even if you are set on doing one particular thing, I encourage you to read through all of the following sections as I frequently say things in one section that are relevant to another section. And keep an open mind.

## 2 Academia

In my experience, it appears that most advisors prepare their students for postdoc positions and nothing else. While it is good that they are being prepared for such positions, some students are better suited for teaching institutions and some should look into this as a secondary plan. My situation was a little different as my advisor has a stronger history of preparing his PhD students for teaching positions. If you haven't already, you should investigate the trajectory and success (or failure) of your advisor's previous students to see where they landed. This, for me, was an early indicator of the type of jobs my advisor was expecting me to land. It also signaled to me the need to better self-prepare for positions that were out of step with these previous students. To find your advisors past students, you can visit the meticulously updated

<https://genealogy.math.ndsu.nodak.edu/> and search for your advisor. Of course you may have an advisor without any previous students. In this case you are the oldest child acting as the harbinger for future students. I actually recommend that you do this as early as possible in your graduate career to make sure that you are on the right career path, if your options allow this. At any rate, you should be flexible and prepared for assorted scenarios.

## 2.1 Teaching Positions

A good application for a teaching institution looks very different than one for a research institution. The main hub for applying to math jobs is the website [mathjobs.org](http://mathjobs.org). Essentially every research position is going to be on this site and most teaching positions as well. Another site you should keep an eye on, particularly for teaching positions, is [higheredjobs.com](http://higheredjobs.com). While most applications for research positions will be submitted through [mathjobs.org](http://mathjobs.org), many teaching positions, often times posted on [mathjobs.org](http://mathjobs.org), will have you apply through an alternative platform. This can be particularly time consuming and frustrating. One problem is that, unlike [mathjobs.org](http://mathjobs.org) where your recommenders need only upload a letter once, each platform requires the reference letters to be sent individually. Standard advice will recommend that you apply to 100 (!) or more jobs to optimize your probability of someone actually reading and liking your application. As you can imagine, if all of these opportunities use different online platforms, then you have to ask your recommenders to send out 100 letters! Now, some jobs will be on [mathjobs.org](http://mathjobs.org) and some overlap on sites like [interfolio.com](http://interfolio.com) which will reduce this number. But if you apply to a lot of these sorts of positions, expect to have your recommenders send out 30-40 letters. Don't, however, let this intimidate you. Don't be afraid to ask your recommenders to send their letters to a hundred institutions if necessary. It is their job and, fortunately, in my case they were happy to do it. Don't be embarrassed to ask this. They don't (or shouldn't!) mind and it could drastically alter your future life trajectory.

Many institutions where the primary focus is teaching will have an interview booth at the yearly Joint Math Meetings (JMM) in January. While I strongly recommend attending and presenting at this conference in your final year as a PhD student, it is not yet clear to me that it is necessary, especially if you are looking for a research position. I am not sure of a better opportunity for networking though. It wouldn't hurt to go the year before you graduate as well.

Go to Mathfest also. You don't have to wait until your last year to do these things. I wish someone would have told me that. Math is an isolating profession the way it is, being able to connect with other people doing similar work can be very encouraging.

I had a few interviews at the JMM for such institutions and it is clear that the most common problem they face is that applicants don't understand what they are getting themselves into. This is probably a failure on the part of the advisor to appropriately signal to the student what the expectations are for such a university (hint: good teaching skills). The one question that I was unfailingly asked at every JMM interview (remember these are for teaching institutions) is what I thought the research/teaching/service expectations were in terms of a percentage. Teaching should take the biggest slice of the pie in this case.

### 2.1.1 SLACS and Small Teaching Colleges

SLAC stands for selective liberal arts college. The central mission of these institutions is not career-focused (think business, nursing, engineering, etc.) but rather focused on the liberal arts. Many of the less prestigious small colleges frequently hire *in-house* meaning people who got degrees from small teaching colleges or have some strong connection. This is likely in the interest of faculty retention. If you have experience with such an institution, then you know what you are getting yourself into and won't back out a few years down the road after realizing the small-town life isn't for you. SLAC could also stand for small liberal arts colleges and I will use the acronym interchangeably. One thing that I wish I had known was that more prestigious SLACs aren't likely to hire someone with a freshly minted PhD.<sup>1</sup> They also usually have a higher standard for research. You have to teach well and do good research to land a position at such a place. If you really want to work at one of these places, wait until late January/February for them to post (usually) 3-year visiting positions. These are the positions geared for rookies.

Your chances of getting a tenure-track position fresh out of graduate school are realistic only if you are focused on the remaining SLACs and more teaching based state universities. For such institutions, you really ought to emphasize your teaching abilities, ideas for undergraduate research projects, and service opportunities.

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<sup>1</sup>Look up the best liberal arts colleges on *U.S. News: Best Colleges and Universities* for a list

### 2.1.2 Institutions of Faith

Another option, for those of Christian faith, is to apply to Christian institutions. It *should* go without saying, if you are going to apply to one of these, you should really be a Christian! If you're not, it will come up sooner or later and will end up being a waste of everyone's time. I say *should* because it is an unfortunate fact that there are applicants to these places that do not share the institution's beliefs and are willing to sign a statement of faith without actually adhering to it. In addition, usually you are required to write an essay about your faith and it's more likely than not that this isn't going to be very well-written if you are not a person of faith. In fact, a lot of small institutions, not just faith-based ones, make you jump through inconvenient hoops and write essays in order to see if you are really committed to taking the time to apply for their job. After all, since the advent of mathjobs.org, the common applicant strategy is to flood the market and hope probability is on their side. These inconveniences can act as a deterrent for non-serious applicants or litmus tests for candidates that aren't as dedicated to a position. This can also work to your advantage. In *Thinking, Fast and Slow*, Nobel Prize winner Daniel Kahneman notes that one of his strategies to see how an average person would respond to a situation is to first reflect on his own first reaction to a situation. I encourage you to do the same. The more of a hurdle you find it is to apply to a place, the less applications they probably get. For example, I viewed one application that required something like five essays to be written in addition to the usual documents. At first I thought this was crazy and that I wasn't going to waste my time, I then realized that most other applicants are probably thinking the same thing and that if I take the time to complete these essays, I would have a better chance of getting an offer than if there were no essays to be written in the first place.

### 2.1.3 Assistant Teaching Professor/Postdoc

There is also a new category becoming increasingly more popular. The assistant teaching professorships and teaching postdocs. As far as I can tell, these are a sort of glorified lecturer positions. It is unfortunate that this trend is making less room for those who want to be teachers and engage in research. I'm not sure that you are expected to maintain any research program in such a position. I do know of one case where someone acquired a good position at a SLAC after doing one of these. It could act as the 'postdoc' buffer between

your freshly minted doctorate and tenure-track SLAC position, but I doubt it will do anything more.

## 2.2 Research Positions

These sorts of positions will have labels such as postdoctoral positions, visiting assistant professor, and research associate. Keep this in mind when combing through the opportunities on mathjobs.org. Don't just look for positions that have the word 'postdoc' in them. Just clicking the sort by 'postdocs' link will cause you to miss a lot of these positions. Also don't sort by deadline! My experience was that a third of the institutions don't put their deadline in the right spot and thus do not show up in the appropriate place when sorting this way. On the other hand, if you are tethered geographically or just have a strong preference for a region, the sort by state (or in the case of higheredjobs.com, by region) option seems to pretty reliable.

The first and most important thing that you should know about these positions, at least as far as I have ever heard or seen, is that, with a few exceptions, they are inside jobs. If your advisor is not pulling some strings for you or the place you are applying doesn't have a faculty member advocating for you, your chances of getting an offer aren't so good. Here are some words of advice if you want to land one of these positions.

- Investigate what big institutions have previously accepted PhD students from your institution. Universities that have hired, and had good experiences, with students from your institution will be more likely to hire from your institution again.
- Go to the institution and invite yourself to give a talk at a seminar. This can be particularly difficult if you live far away but it is what it is. Try to organize this earlier rather than later. Making contacts early on is very important.
- Try to publish something. It seems to be the standard now that you are unlikely to get a good research position without any publications to your name. As silly as it is, rather than trying to put your results into one coherent whole that is your thesis, try to carve out a chunk prematurely and get it published before applying to research positions. In addition to your advisor, seek help and second opinions from your committee members or other professors as well.

You should also invite potential future colleagues/employers to your JMM presentation. Especially if the institution of interest is too far to drive and give a presentation. I had one professor from a place in which I applied for a research position thank me for inviting him and gave me positive feedback. This might sound crazy but another thing you ought to do is to practice your talk 15 (!) times before actually presenting. Presenting at the JMM was the first time I tried this and it worked out quite well. After such practice, you will find that you have full command of your presentation which will thread together like a beautifully knit quilt.

Another thing that's good to know, mathjobs.org allows you to upload more than one letter per recommender. Have your recommenders (including your advisor) observe your teaching and write two letters for you, one research focused and one teaching focused.<sup>2</sup> If possible, have them upload the letters at the same time. I had one reference write a teaching letter, then sometime later a research letter. The second was automatically uploaded to the teaching positions I had already applied for. I noticed this a day later and find it unlikely that anyone saw both letters before I corrected it, but it's something to keep in mind.

I would also recommend keeping a shared Google sheets doc with each recommender to keep track of the places which you have applied and which the recommender has submitted a letter. While this will primarily matter for teaching positions, it did apply to a few research positions to which I applied, including a few domestic positions. Applying to 100 jobs is *exhausting*. I actually only applied to about 75 places but did find a second wind in late January after getting exhausted from the process in early December. Organization from the start is key. This will also minimize the number of mistakes in your applications. While I have yet to see how it will work out, I also applied to places that I thought would be an excellent fit before they posted any positions. In two cases I actually was ahead of the curve (they were preparing to submit a posting) and received positive feedback from them about my interest.

### 2.3 A Quick Word about Interviews

While there is a lot of information out there regarding advice about how to perform well in an interview (practice, practice, practice), I thought I'd make a comment on something that either I missed or wasn't explicitly stated in

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<sup>2</sup>You will likely need a teaching recommendation as well. This recommender doesn't need to write two letters.

anything that I read. My institution had no infrastructure in place for interview preparations but that shouldn't stop you. You should get involved with (or start!) your institutions AMS student chapter and organize a practice interview session with other graduating students, if there are any. This will help you be comfortable with answering questions on the fly.

If I could go back in time to December and give myself one piece of information that was overlooked in my interview preparations, it would be this:

*Prepare to carry the entire interview.*

I have had nine interviews and found this to be exceptionally important. What I mean is that, you will have some time where the interviewers ask you questions and talk a little about the institution. They also will ask if you have any questions or comments for them. These two categories of conversation do not bifurcate the time in any sort of balanced manner. Be prepared to kindle the conversation for the *entire time* of the interview if necessary. For example, my first Zoom interview<sup>3</sup> was with a committee of about eight interviewers. They asked me questions for about fifteen minutes before giving me the floor. After about ten minutes, I ran out of things to say and the conversation ended in an awkward manner. Also, my last questions started getting strange because I was making them up on the spot! It might go without saying that I never heard back from them. Flash forward three weeks and I find myself in the same situation, a committee of about eight people. Only this time, they gave me the floor after only ten minutes of inquiry! But I learned. I not only was prepared for this, but I started implementing strategies to burn time such as asking a question that was directed to be answered by each committee member. 8 times 2 minutes per response burns 16 minutes! I kindled the conversation for 45 minutes with reasonable questions and inquiries. I was invited for a campus interview the following day.

### **3 B.I.G. (Business, Industry, Government)**

Mathjobs has a section under the Employment Center where you can 'opt-in' to let B.I.G. employers see your resume. You really ought to do this, even if a B.I.G. job isn't your plan A. I told two friends searching for academic jobs about this option and they both landed interviews at the JMM. These jobs pay

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<sup>3</sup>Zoom is a webcam platform like Skype

better than academia but you will have to work on other peoples' problems and not your own. Since many of these jobs involve working for the government or contracting with the government, it is particularly helpful if you are a U.S. citizen. One thing that did surprise me was that there are B.I.G. jobs that aren't really concerned with your programming background. At first I thought that it would be a waste of everyone's time for me to apply (but I made my resume available anyway!) since I have practically no programming experience. I was surprised to find out that for some positions, this just doesn't matter. Cast a wide net, just in case.

A few other items that will improve your chances for a B.I.G. position are the following:

- Do a summer internship. While many of these are restricted to U.S. citizens, there are plenty of positions that are not. It is hard to find the time for one of these if your intentions are to go into academia, but if you can find the time, it would be quite helpful.
- Study statistics! Take a few graduate courses in statistics. It's not even necessary to have **any** undergraduate background in stats. I took a few graduate courses in statistics without any stats background and fared just fine. Having some applied math or statistics is really a big plus in almost every way. We live in a stochastic century and I can tell you that the lion's share of teaching positions or industry positions will look *much* more kindly on your application with some stats background.

Another thing you ought to look out for is whether your work is dependent on contracts or not. I didn't even realize there was a difference until one of the jobs with which I interviewed pointed out that if you worked for them, you'd have a steady 9-5 job that wouldn't rely on contract work. I later was approached by a national lab looking to hire and realized that they contracted out their work. In such a case, you have to constantly vie for jobs to contract. I really don't know how much people who do this have to stress about finding their next contract, but I can imagine that not being dependent on contract work is better.

## 4 The Two-Body Problem

The two-body problem refers to the situation where you and your spouse are trying to simultaneously land a position at nearby (or the same!) institutions at the same time. While this is a difficult task, it is not impossible. I know of one married couple that solved the problem for their postdoc and tenure-track positions. Do keep in mind that you do not need to land a position at the same institution. Often times there are clusters of universities in one spot. Otherwise, search for institutions within reasonable driving distance.

From my understanding, the word on the street is that it used to be the expectation that, in order to obtain a good permanent position, spouses would almost certainly have to live apart for a few years. From my personal experience, this is still the (off-the-record?) advice given to married couples, sometimes with small children, by advisors and committee members of students seeking a long-term productive research career. I have personally witnessed this numerous times. I disagree with this sentiment in the strongest possible sense and urge you to do the same. I'm going to go ahead and say this should be written in stone:

Your family is more important than your research.

I wish the mathematical community would do more to combat this expectation of separation.<sup>4</sup> You should negotiate hard to solve the two-body problem and let your advisor know in no uncertain terms that living apart is not an option and it is ridiculous to even entertain the thought, especially if you have children.

## 5 The Struggle is Real

And so is the competition. This competition rings true in the fight for a postdoctoral offer. Once another graduate student refused to look up a reference on a presentation I made because it required that he visit my website, thus giving another “view” to my site. Another time, after a graduate student learned that he received a good offer, the first response of a classmate was to say something negative about the place in lieu of a ‘congratulations’. My advice to you is not to be so petty! Celebrate your classmates’ accomplishments and

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<sup>4</sup>There was significant uproar after the Trump administration gave a greenlight to separate immigration families at the border. Is the mathematical community anymore righteous?

be humble/thankful if you receive a good offer. The difference between you and someone who did not receive a good offer is most likely due to acts of luck and not anyone's inherent ability. It is better for everyone involved.

## **6 When should I panic?**

The short answer is that you shouldn't. It doesn't help anything. Do recall the second word of advice I was given, that late offers come. While unlikely, I know of one case where someone was offered a desirable tenure-track position in July after the search committee failed to find strong for the position. Try to keep active, academically and physically, it will help. One of the best decisions that I made in graduate school was to pick up running as a hobby. Make a nice website and keep it up to date. If nothing comes your way now, keep persevering and keep an open mind. Be thankful that you had the opportunity to acquire a doctorate and remember that trials build character. Good things will come eventually.