ADVICE ON LOOKING FOR A RESEARCH JOB

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1. WHAT IF I WANT MORE INFO?

The AMS website has lots more information and advice about a job search:

`http://www.ams.org/profession/profession`

is a good place to start.

2. DO I WANT A RESEARCH JOB?

Basically, the most important thing to think about before pursuing a research job is to ask yourself if you have seriously enjoyed (or are enjoying) working on your thesis, despite all the frustrations it entails. Further research after your thesis is going to feel a lot the same way as your thesis did (except that you'll be expected to produce results more quickly.) So you have to enjoy this process enough to want to repeat it over and over. The idea is that you get intrigued by a problem, work on it for a long time, reaching many dead ends along the way, and then sometimes you solve it or some part of it. Then, after a (usually short) period of reveling in the feeling of accomplishment, and after a (usually long) period of carefully writing up your result, you are willing to start the whole process again with another problem.

If the thought of spending the great majority of your time each day teaching or thinking about teaching sounds attractive to you, you may prefer a teaching job. If you are serious about research, as much as you might enjoy teaching, you should really want to grab as much of your working day as you can to think about research; a certain amount of obsession about the current problem (or problems) you are working on is probably a good thing.

If you love research and hate teaching, you could consider a research job in industry, such as at the NSA.

3. HOW DO I FIGURE OUT WHERE TO APPLY?

Most jobs these days are posted on the website www.mathjobs.org, and one applies by submitting one's application materials there, and having recommenders submit their letters there.

However, not all jobs get listed there. Other places to look for postings are the Chronicle of Higher Education, Notices of the AMS, and EIMS (employment information in the mathematical sciences) which is also found at the AMS website. Though this article is primarily about finding research-oriented jobs, the AMS website is also a good place to look for teaching-oriented jobs and they also have some postings about industry jobs.

It is also important to check the websites of research departments and see if they have posted job opening information. Sometimes the information on the individual department websites is different or more current than the AMS posting. At the

same time, you can look at the list of faculty on the department website, and try to find the one or two faculty members (if any) which are closest in research area to your interests. You will mention those faculty in your cover letter.

Most of you who want to pursue research will start by trying to find a postdoc job after graduation. The departments with postdoc jobs are usually some subset of the departments which offer PhDs. The AMS has lists of PhD granting departments, arranged into roughly ranked groups, at

`http://www.ams.org/profession/data/annual-survey/groups_des`

Since not all math department web sites are named what you might first guess (MIT's is math.mit.edu and it took me a long time to remember not to put www in front), Penn State has a nice alphabetized list of links to mathematics department websites at

`http://www.math.psu.edu/MathLists/Contents.html`

Of course there are typically some broken links in there.

If you are willing to possibly move to Europe or even farther afield, there are other websites tracking these positions. For example, see the webpage of the European Mathematics Society

`www.euro-math-soc.eu/`

4. If I want a postdoc, should I apply to every department that posts a postdoc opening?

Maybe. In recent years there have been on the order of 50 departments with postdoc openings, so this is not entirely unreasonable.

However, if a department has no one working remotely in your area, you might want to think whether it is even worth applying there. This applies especially if your research is in an area with a smaller number of practitioners. Also, if a department is located somewhere you think you absolutely would not move to, you just waste time applying there. But probably it is not a wise idea to be so choosy at this stage in the game. A postdoc is only temporary, after all, and you are hoping to go there primarily to do lots of math, and you don't have to love the location.

5. How do I increase my chances of success?

First of all, my impression is that almost always, if a student is offered a postdoc by a department, it is a result of one or more faculty at that department expressing their own personal interest in having that student come to the department.

So the number one factor in your favor is for your thesis research to be impressive and to interest a fair number of other mathematicians. This is one of the harder variables to control. But the earlier you start doing research, the better. If you solve all or part of a thesis problem in your fourth year, don't rest on your laurels. There are always other related problems to work on. Keep working, trying to get more results or improved results. Finally, by the time you are ready to apply for jobs, it is very helpful to have a preprint ready to circulate. This can be a preliminary version of your thesis, in journal-article form, say. Do not wait until you have done all of the research to start writing it down. If some part of your thesis is ready to publish before your graduate, great, of course do that. But having some sort of write-up with whatever results you have already obtained ready by job application

time is very useful in any case, whether or not it is ready for publication. If it is fairly polished, you can also post this on the math archive (www.arxiv.org).

Next, try to identify the other mathematicians around the country that might be interested in your research. Your advisor can help you figure out who these people are. But faculty whose interests are a little more tangential and whom your advisor may not know well or at all are also worth identifying. For each place to which you will apply, try to find at least one such person.

You have to make these other mathematicians aware of your achievement. Try to attend conferences which have special sessions in your area. Try to get an invitation to talk about your results. At these conferences, introduce yourself to the people you identified above (This is hard, I know.) See if your advisor is willing to send e-mails to his colleagues elsewhere alerting them to your work and that you will be applying for postdocs. It may be worth attending the AMS national conference in January of the year you are applying, even if there are no special sessions in your area. The employment center is more or less useless if you are primarily interested in a research job. (If you are potentially interested in more teaching-oriented jobs as well as research jobs, attending the employment center is likely worthwhile.) But lots of people go to these meetings for committee work, even if there is no special session in their research area. Thus it may be possible to find and introduce yourself to mathematicians in your area here.

Finally, think carefully about who to ask to write a letter of recommendation for you. Of course your advisor writes one. If you and/or your advisor know someone at another university who is willing to write for you, it looks very good to have at least one letter from someone outside your home department. Try to pick people who you think really will fairly represent your case, and who know your work well enough (or are willing to look over your stuff enough to get up to speed) to write a detailed letter. Short letters that come right to the point are sometimes quite appropriate, but a letter in your file that makes it clear the writer hardly knows you and has little or no opinion won't help. You may hear through the grapevine that certain professors write letters that are overly critical or otherwise peculiar. Don't ask those people for letters if you can avoid it, unless you are absolutely sure they have a very high opinion of you.

6. Documents in the Application

You will need to write a research statement. This should not be too long (5 pages seems about right, but not a hard and fast rule) or excessively detailed. At least in a first introductory section, aim to summarize your work and make it comprehensible to mathematicians in other research areas. The rest of the statement can be more specialized; for the most part probably only the faculty who are really interested in your area will read the whole thing. In your preliminary thesis write-up, your research statement, and in any talks you give on your research in-progress, it is very important to "frame" your results in a way which will entice others. Be aware of other other problems related to yours in which people have interest, and aim to show how what you have done fits into the bigger picture. Make it clear that you have concrete ideas for further research that expand upon what you have already done.

Try to personalize your cover letters. I'm not sure how important this really is for research jobs (although I gather it is very important for teaching jobs). If you

can mention something particular about the department that makes you think you would be a good fit there, that's good. Most importantly, you can mention in the cover letter the names of the one or two faculty members at that institution you hope will find your application of interest. If those faculty are already aware of your application another way (such as e-mail from your advisor), all the better. I don't recommend sending e-mails yourself unless you already have a personal relationship with the person (if you got to know them fairly well at a conference, for example.)

The teaching statement is not nearly as important, in my impression, when applying for a postdoc (although it is very important for teaching jobs). Aim to show you have an interest and passion for teaching, and that you have some concrete ideas about how to teach well. Describe specific teaching successes you have had, and what kinds of teaching experiences you are looking forward to in the future. Give all of your teaching evaluation data to a local faculty member and ask them to write you a teaching recommendation. If your teaching evaluations are not so hot, make it clear that you are working hard to improve your teaching—if your research is good, this will not sink your application. I think it is best to stay away from overly general statements about teaching philosophy. These can easily sound contrived. Keep things as close to your personal experience as possible.

The CV should contain your educational history (starting with your undergrad degree), awards and honors, publications and preprints (if any, don't worry if not), list of talks given and conferences attended, and teaching experience. You can find some CV TeX templates online which will help you make your CV look nice.

For all of these documents, ask older students who have had some success with their applications to share their research/teaching statements with you so you can get an idea of where to start. Or you can find samples online.

7. NSF Postdoc

If you and your advisor agree that your thesis results so far are significant, you are sure you want to pursue a research postdoc, and you have plenty of ideas for what to do next, you may want to apply for an NSF Postdoctoral fellowship. This is another big headache because the application is due before your job applications will be. But it is worth doing if you think you have a good chance of getting one.

8. Persist!

If you are really serious about research, but you don't get any offers the first time you apply, don't give up. There is randomness built into the process. Try to find a one-year temporary position, or a way to stay on at your current institution, and try again next year. In the meantime you can beef up your CV by developing your research more and possibly submitting your thesis work for publication (assuming you haven't already).