How to Get a Job in Academics

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Doctoral students in statistics who seek jobs in academics may know very little about the process of obtaining such a job and what they should do during their years in graduate school to improve their chances of being offered a job in academics. Although students may see job candidates present seminars in their departments, they are unlikely to be aware of what the candidate is doing during the rest of the visit to the department. They are also unlikely to gain from the experiences of other students who have gone through the job search process in previous years because those students graduate and leave and, hence, are unavailable to give advice. This article presents information and advice for students who plan to seek a job in academics. Although some of the article pertains to the interview process itself, it also gives advice for preparing for a job in academics throughout the student's years in graduate school. Much of this advice is applicable to all Ph.D. students, whether or not they go into academics. Although the advice is meant for graduate students, this article may also be a useful resource for advisors, mentors, department heads, and others who help guide students through their graduate studies.

KEY WORDS: Education; Graduate school.

1. INTRODUCTION

Several years ago when my first doctoral student was looking for a job in academics, I developed a list of questions that she might be asked on an interview and a list of questions she might wish to ask during the interview. Since that time, those lists have been circulated among other students in my department who were seeking academic jobs. It occurred to me, from my own experience and what I have observed in students in my department as well as in candidates interviewing here, that most Ph.D. students know very little about what to do to improve their chances of obtaining a job in academics. In particular, I have been surprised at how ill prepared some job candidates have been for the interview in my department. Therefore, I thought it might be useful for both students and their advisors if some advice were available for them.

I try to start preparing my own students who wish to seek an academic job to be good candidates for such jobs from the beginning of their graduate studies. In the following, I present the advice that I have given to students over the years as they contemplate and apply for academic positions. This advice is based on my own experience as a graduate student seeking an academic position, as a faculty member interviewing job candidates, and as a member of my department's hiring committee. Although the "you" in this article is addressed to graduate students, it is my hope that this advice will be useful not only to students who are seeking jobs in academics but also to their advisors, mentors, department heads, and others who wish to help students prepare for such jobs.

Most of the experiences that make a student a good candidate for an academic job also make that student a good candidate for a job in industry or government. Thus, students who are uncertain as to what career path they wish to take would not be hurt if they try to follow this article's advice.

Section 2 suggests what students should consider doing during their graduate school years to help prepare themselves to be good candidates for a job in academics. Section 3 discusses the process of applying for academic jobs. Section 4 provides a description of and advice for the job interview. Section 5 presents conclusions and some final advice.

2. WHAT TO DO DURING GRADUATE SCHOOL

The choices that you make as a student in graduate school can help or hinder you in obtaining an academic job; it is to your advantage to make choices that will make you a more attractive job candidate. Choices that students must make include the sort of assistantship work to do while working toward their degrees; who to choose as an advisor and as dissertation committee members; and what topic to choose for your dissertation. In the following, I consider each of these choices and other things you can do during your graduate school years to make obtaining an academic job more likely.

2.1 Jobs During Graduate School

Job candidates who have had a variety of experiences while in graduate school are more attractive, more likely to stand out from other candidates, and more likely to get an interview. Thus, I encourage my students to take ad-

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vantage of all the various work opportunities available to them during graduate school. These include gaining classroom teaching experience, working on grants as a research assistant, and working on consulting projects.

Students considering jobs in academics should gain classroom experience by taking a teaching assistantship for some time and they should work to develop good teaching skills. When you apply for an academic job, it is particularly helpful if at least one of your letters of recommendation is written by someone who can comment on your teaching skills. This is particularly important for non-native English speakers who will need evidence that they will be successful in the classroom. If possible, you should try to get a variety of teaching experiences; for example, both as a recitation or lab instructor and as an instructor with responsibility for your own class. This shows that you have experience with large classes (through the recitation or lab sections) and that you have experience directing your own course, preparing homework assignments, writing exams, and assigning grades.

A second type of experience is to work as a research assistant on a grant with one or more faculty members. This helps you to develop skills in doing collaborative work, may give you a broader range of research experiences than you will get just working on your dissertation research, and introduces you to the world of sponsored research. You may obtain experience in writing reports describing research findings and in preparing or giving presentations on the research. You may also have a chance to be a co-author on a paper based on the research. In addition, the professor with whom you work will be able to write a letter of recommendation describing your invaluable contribution to the work on the research.

If your department has a consulting service or class on consulting, I also recommend that you take advantage of the opportunity to obtain consulting experience. Many universities and colleges today expect new faculty members in statistics to engage in collaborative research with researchers from other departments. Your work as a student on consulting projects will show that you can explain statistical matters to nonstatisticians; that you can communicate well; and that you have practical experience with the analysis of real data and report writing.

Finally, I should note that some departments have limited numbers of research or consulting positions for graduate students. In such cases, these positions are typically offered to the students who performed best in their classes and who have good computing and communication skills.

2.2 Developing Your Communication Skills

I cannot say it too strongly: take every opportunity available to you to develop good written and oral communication skills. Faculty members need excellent oral communication skills to be able to reach students in their classes, of course. They also need excellent written communication skills to write papers, grant proposals, and committee reports. When you apply for an academic job, your letter of application and any written statements that the school may require (for example, some schools ask for a research statement, some for a statement of teaching philosophy) will be used to help assess your written communication skills. Your oral communication skills may be assessed through a preinterview phone call and during the interview itself.

There are a number of ways to practice your oral communication skills. If your department has a seminar series, agree to give a seminar. If you have a chance to give a talk in a class, take it. Attend the Joint Statistical Meetings, or one of the many other statistics conferences, and present your work in a contributed paper session. [See Scott (1997) for advice on participation in the Joint Statistical Meetings.] The more experience you have talking to a group about your research, or other topics, the more comfortable you will be giving your seminar during a job interview.

Non-native English speakers, in particular, should work to improve their spoken English. In today's political climate, with undergraduate students complaining loudly (if not always fairly) about not being able to understand their instructors, and state legislators or private institutions responding to those complaints, most departments simply cannot afford to hire a faculty member who, although a fine researcher, has trouble being understood in the classroom. Thus, if you want an academic job, your spoken English is critically important. The best advice I can give you is to speak in English as much as possible. Avoid spending all of your time with other students from your country. Socialize with American students. Join study groups with them. Consider sharing an apartment with a native English speaker rather than with someone from your own country. Ask your fellow students or faculty members to correct your English; they will almost certainly be glad to try to help you. I realize that this is difficult and uncomfortable. It is, however, necessary. (American students: try reaching out to students from other countries. You, too, will benefit from the experience.)

Writing skills are also important and you will want to develop those skills as part of your graduate education. Of course, you will learn a lot about technical writing on the dissertation itself. But there are other ways to gain writing experience outside of the classroom. For example, if you work as a research assistant on a grant, there may be regular reports due as part of the requirements for the grant. Similarly, consulting projects often require final reports that you could help write. Most importantly, if you have the opportunity to write a paper on your dissertation research or to be a co-author on another research paper while you are in graduate school, you should certainly do so. Not only will you gain the valuable experience of writing a research paper, but applicants with papers submitted for publication or already published are more attractive job candidates.

2.3 Choosing Your Advisor, Topic, and Committee

A number of students have asked me if, because they want a job in academics, they should choose a famous advisor. I think that it is far more important to choose as an advisor someone with whom you will enjoy working and who has an established research program in an area of interest to you. I advise students in my department to take readings courses with a few faculty members during their

first two years in the program. This helps them learn about faculty members' research areas and their advising styles. You should also ask the more senior students in your department about their experiences with their advisors.

If you go into academics, you are likely to be working on problems related to your dissertation topic for a long time. Thus, you should choose a topic that is stimulating and rich enough so that you can continue doing research in that area as a new faculty member working toward tenure. For example, instead of choosing to work on a small improvement to an existing method or another minor extension in an area that is already well-developed, you might choose to work on an important application of statistics to science or engineering where there are many problems that you can continue to work on after you complete your dissertation.

As a faculty member you will need to develop your own research program based on your own ideas. Thus, you should work to develop some of your own research ideas as part of your dissertation, rather than relying on your advisor to suggest all research questions. In the short term, your enthusiasm for your dissertation topic is likely to show when you give your job seminar and discuss your research during your interviews. Candidates who are excited by their work and show it are more likely to make a lasting impression.

Having said all that, I agree that it is useful to have a more senior faculty member with a national reputation who knows you and can write a letter of recommendation for you. This is particularly important if you are seeking a position at a top research institution. If you do not have such a person for your advisor, you might consider asking one to be a member of your dissertation committee. Another option is to do some other type of work with a more senior faculty member, for example serving as a teaching assistant or research assistant for such a professor.

2.4 A Few Other Thoughts

There are a few miscellaneous things not yet covered that deserve a brief mention: grades, computers, and statistical applications. Yes, you should do well in your classes in graduate school. Schools typically ask for your transcripts when you apply for a job. These transcripts are reviewed by hiring committees for both the grades you made in your classes and the variety of classes you took. It is a good idea to take classes across as many areas of statistics as possible (not just in your research area) and, if you are interested in a career at a research institution, to take classes that will be useful to you as a researcher such as those in statistical computing or large sample theory.

It is difficult to be a statistician today and not use a computer. Take advantage of the opportunities in graduate school to gain experience with a number of computing environments (PCs, MACs, Unix workstations) and statistical packages. This will serve you well as a researcher, when you have to write your own computer routines, and as a teacher or consultant, when you need to use statistical packages for data analysis.

Many statisticians today believe that the interesting statistical problems of the future will be driven by applications. Research funding may also be more likely to come from interdisciplinary research and from nontraditional sources such as local governments and industry. If your dissertation research is motivated by an application or you have worked on such problems through a research assistantship or consulting, you may be a more attractive job candidate. If you have the interest and opportunity to do such work, I would encourage you to seize the opportunity.

3. APPLYING FOR ACADEMIC JOBS

Announcements of academic job openings can be found in the *Amstat News*, the *IMS Bulletin*, *Employment Information in the Mathematical Sciences*, the newsletter of the Caucus for Women in Statistics, the *Chronicle of Higher Education*, and at various locations on the Internet (e.g., see the ASA, IMS, and AMS Web pages). The announcements also give deadlines for applications. The earliest deadline is typically in late fall. You will want to review these listings carefully to decide where to apply. Be realistic in preparing your list; apply only to schools that have the teaching/research requirements that match your talents and career goals, and that are in places you would be willing to live. There is no point in applying to an undergraduate liberal arts school, for example, if your main interest is in doing research. It is not fair to the schools or to other students who are in the job market for you to waste time and resources at schools where you would not accept a job. On the other hand, do not restrict yourself to so few schools that you have little chance of getting an interview and a job offer. You should go over your list of schools with your advisor or another faculty member before you start sending out applications.

The application will include a cover letter and your resume at a minimum. Jobs in mathematics departments may ask that you include the AMS Standard Cover Sheet (see the American Mathematical Society's Web page for a copy of this sheet). Your cover letter should be brief, stating what position you are applying for and pointing out any special qualifications you might have for the position. You can also note who will be sending letters of recommendation for you and, if required, that you have asked for your transcripts to be sent. If you are applying to a research institution, you might include an abstract of your dissertation research or a research statement describing what research you have done and what your future research plans are. If you have papers that have been published or are accepted for publication, you may wish to send copies of them with your application. Many schools, particularly undergraduate institutions, ask for a statement describing your teaching philosophy. Anything that you include in your application should be carefully written, revised, and polished. This is the first chance that you have to make a good impression; misspellings and grammatical errors will hurt your case. It is a good idea to ask your advisor or another faculty member to go over your resume and any research or teaching statement you write to give you comments and suggestions.

Most job postings request three or four letters of recommendation. These are generally sent directly from the per-

son writing the letter. One letter should be from your advisor; not having a letter from the applicant's advisor leads the committee reviewing applications to wonder why the advisor did not write. It is an advantage if the other letters are from people who can comment on various aspects of your training in graduate school. For example, one letter might be from someone who can comment on your skills in the classroom, one from someone with whom you worked on a research project, and one from someone with whom you worked on a consulting project. Because you will eventually need letters of recommendation from faculty members with whom you work during graduate school, it is important to always do the best job possible no matter what the task. You should also get to know the faculty members so that they are aware of you, and the various aspects of your work, and can write a detailed letter of recommendation for you.

When all your application materials are received by a department, they are typically reviewed by a search committee. Some larger statistics departments and many mathematics departments receive hundreds of applications. The search committee screens the applications for top candidates who best match their department's research interests and needs. In any given year, your competition on the job market and the needs of the departments to which you might apply can be very different. You, of course, have no control over these factors which can be important in determining how likely you are to get an interview. Departments typically invite candidates for interviews in January through March.

Some departments contact job candidates on their "short list" of top applicants by telephone before inviting them to come for an interview. These calls are used to assess applicants' interest in the job and their communication skills (particularly for those who are not native English speakers). It is hard to be prepared for these calls. You might want to ask if you could set an appointment to call back at a more convenient time (when you are not holding your office hour, running off to teach, or heading for class).

If you have time to prepare for a phone call, and certainly before you go on an interview, you will want to learn as much about the department as possible. Most departments have Web pages. Check out the Web page to learn who the faculty members are and what their interests are. See what type of programs the department offers and what classes the department teaches. This will prepare you to answer questions about whom you might like to work with in the department and what sorts of changes you might suggest in their curriculum.

4. THE INTERVIEW

Interviews typically last a day or more. It's exhausting, but it can also be fun. Your seminar is just one small, but very important part of the interview process. You can expect to meet with faculty members over lunch, dinner, and possibly breakfast. During the day you will probably meet with individual faculty members for 20–30 minutes each and with the department chairman for a longer period. At many institutions you will also meet with the college dean. Some institutions ask if you would like to meet with a group of students, or you may request such a meeting. Some departments also have parties or receptions in the evening for the job candidate. These meetings give you a chance to get to know the people with whom you would be working, to get information about the department, university, and location, and to learn how the department treats its junior faculty members.

You will want to be prepared to answer questions that are likely to come up in these meetings. Below is a list of questions that I was asked in my interviews or that I have asked, or heard asked, of candidates.

4.1 Questions You Might Be Asked

Teaching

- What sorts of classes have you taught?
- Do you enjoy teaching?
- What classes would you like to teach here?
- What changes would you like to see made in our curriculum?

Research

- Describe your dissertation research in a way that a nonstatistician would understand.
- Are there areas other than your dissertation topic in which you would like to do research?
- How do you develop ideas for research problems?
- In there anyone particular in the department with whom you would like to work?
- What are your research plans for the next two or three years?

Consulting/Collaborations

- What experience do you have consulting?
- Do you think you work well with nonstatisticians?
- Do you like consulting?
- Would you like to do collaborative research? In what areas?

Computing

- How much computing do you do as part of your research?
- Have you taught courses that involved using the computer?
- What machines, operating systems, languages, and statistical packages do you use?
- What would you require as a start-up package for your computing?

Personal

- Why are you looking for an academic job?
- Why did you apply for our position?
- I was always asked (although it is illegal) if I was married and what my spouse was going to do about a job. This issue can come up in friendly conversation as well as during the formal interview. Thus, if it applies to you, you should probably consider how you are going to answer the question if it arises. It is not a good idea to risk insulting your host

by saying, "You can't ask me that!" but you can certainly be prepared with a vague answer.

Asking questions during the interview shows that you have put some thought into what you are looking for in a job. This will make an impression on the people you meet. In addition, faculty members are not trained interviewers. Some meetings can be awkward if you are not prepared with questions to ask. You can take notes during your meetings to help you remember important information. Following is a list of questions that you may wish to ask during your interviews. Do not be shy about asking questions during the interview; remember that you will need the information to make your career decisions.

4.2 Questions You Might Want to Ask

Teaching

- What will my teaching load be?
- What size classes will I have?
- Are faculty members assigned teaching assistants to help with grading?
- What computers/statistical packages are used in teaching?

Research

- What is your (the faculty member with whom you are speaking) area of research? (Or ask a specific question about the faculty member's research based on what you learned about his/her research from departmental materials on the Web or elsewhere.)
- Do you do any collaborative research?
- What sorts of opportunities are there for collaborative research?
- How is applied versus theoretical research valued?

Committee Work/Advising

- What sort of committee work will I be expected to do?
- How much advising will I be expected to do?

Tenure

- What is the length of time before tenure here?
- What am I expected to do to have a successful case for tenure? (Number of publications, grants, teaching record?)
- How are research, teaching, and service weighed in the tenure decision?
- How is the tenure of statisticians handled within this department (if you are interviewing in a nonstatistics department)?
- Do you have a system of mentoring junior faculty? How does it work?
- How are joint publications (particularly those not in statistics journals) considered in tenure cases?
- Do you have an annual review of faculty members? How does that process work?

Benefits and Other Support

- Are there university seed grants for summer support?
- Is teaching an option for getting summer support?
- What amount of support is available for travel to conferences?
- What are the university health and other benefits? (The department chair or the dean's office will probably provide this information.)

Computing

- What computer system and software are available?
- What computer equipment will I have in my office?
- What support is provided for computing (who takes care of the machines)?

Department

- How many faculty members and students do you have?
- How many women/minority faculty members and students are there?
- What sort of jobs do your students get when they graduate?
- What are the long-range goals of the department?

General

- Do you enjoy working in this department?
- How do you like living here?
- What is the cost of housing/living here?
- What sort of cultural/sports/other activities are available?

4.3 Your Job Seminar

It is a good idea, when you agree to visit a department, to get some information about what to expect for your job seminar. Ask how long you should plan on speaking, how many people you can expect to attend the seminar, and what sort of equipment will be available for you to use (e.g., one or more overhead projectors, blackboard, computer with projection system, VCR). You should also find out who will be in the audience and at what level you should pitch your talk. Undergraduate institutions, for example, may be more interested in assessing your teaching skills and may appreciate a less technical talk. You should plan on giving a more technical talk if you are interviewing at a research institution. Some institutions ask for two seminars: one technical talk on your research and one nontechnical. In any case, you need to work hard at giving a very good presentation; your audience will be judging your teaching skills as well as your research skills from your seminar talk.

Becker and Keller-McNulty (1996) and Freeman, Gonzalez, Hoaglin, and Kilss (1983) provided excellent advice on preparing to give a statistical talk. (See, also, the reference lists in those papers.) Thus, I will just mention a few of the most important points here.

The advice I give students who are preparing presentations for me is to think about all the badly presented seminars they have seen and do not do what those speakers did! If you are using an overhead projector or slides make sure that your slides are readable in a large lecture hall (where many seminars are held). *Practice your talk* to make sure that your delivery is smooth and directed at your audience, and that the timing is correct. It is bad form for your talk to

be either too long (the audience gets restless) or too short (the audience may think you have not done enough research yet). Plan what portions of your talk you can drop or condense if you are running out of time. One common mistake that new researchers make is to fail to take proper credit for the research they have done. Be sure that your audience can tell what parts of your presentation are review of the literature and what is your own research.

4.4 Things That Should be Common Sense

You want to show the people with whom you are interviewing that you respect what you are doing and that you take the interview seriously. Therefore, you should dress appropriately. If you are interviewing in a department in a business or professional school you will certainly want to wear a suit. Some statistics and mathematics departments are less formal and you do not need to wear a business suit (although you certainly can) but instead you could wear, for example, a nice sweater and dressier pants or a jacket with pants or skirt. It is not appropriate to wear jeans, shorts, or T-shirts during the interview. At meals or receptions you may be offered an alcoholic beverage. This is not the time to calm your nervousness with alcohol. During your interview, be sure to offer a firm handshake, make eye contact, show your enthusiasm, and thank your hosts (you may also do this in a note following the interview).

You may well say to yourself, "That's just common sense." I agree, but I have also heard horror stories of job candidates who wore shorts, drank too much at dinner, and yelled at a department secretary. These situations are rare, fortunately. I would, however, urge all job candidates to realize that the impressions they make when interviewing are very important not only for themselves but also for their fellow students. The statistical community is really rather small and a story can spread very quickly through that community. Even if you decide within five minutes of the start of your visit that there is no way you would consider taking a job at that institution, you should do your best to make a good impression. Faculty members from various institutions who happen to be working together or are on committees together may compare notes on job candidates. Thus, your performance at one school could, for example, influence whether or not you get an interview at another. In addition, the impression you make during an interview reflects on your own department and the chances that your fellow students will be considered for jobs in the future. More than once I have heard faculty members say that they will not consider another student from a certain school because of a poor showing by a previous candidate from that school.

5. CONCLUSIONS

When I review file after file of job applications for positions in my own department, I notice that there are some things that make a candidate stand out above the rest. These are: a variety of experiences while in graduate school, excellent letters of recommendation, one or more papers submitted or published, and evidence of good communication skills. You can make yourself a more attractive job candidate by the choices you make in graduate school. On an interview you can demonstrate your interest in the position by being prepared with good questions and thoughtful answers. You can show your skill at teaching and research by giving a polished presentation in your job talk.

There are, of course, choices to make after you have one or more job offers. You can do some negotiation about teaching loads (some schools give new faculty members reduced teaching and service loads for a few years), salary, and the start-up package for equipment. Salary data for academic statisticians by type of institution are published yearly in the December *Amstat News*. You should also realize that statisticians in business schools or medical schools may get higher salaries, while those in mathematics departments may get less. Finally, there are a few things to consider in choosing your first job. It is usually easier to move from a research institution to a smaller school with an emphasis on teaching than to go in the opposite direction. It is also usually easier to move from academics to industry than from industry to academics. Thus, you should try that type of position immediately after graduate school if you think it might appeal to you.

Of course, once you get an academic job, you still have to worry about getting tenure so that you can keep the job. There are a number of articles in the literature that offer advice to help you as you strive towards tenure. See, for example, the many articles on teaching in the Teacher's Corner section of *The American Statistician*. There are also articles, such as the one by Trumbo (1989), with information on writing a research proposal.

Unfortunately, even if you follow all of the advice above, you may not get an academic job because of the job market in a particular year. Or you may decide that you would prefer to work in industry or government. In either case, the experience you gained and skills you developed to prepare you for an academic job will also serve you quite well in a nonacademic job.

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