

the prime directive (rule 1). Give the talk you would like to hear.

6. Know your audience—you must know what things you should explain, what things require only a reminder, and what things everyone already knows. Explain what is needed, but don't belabor the obvious.
7. The gods must be able to compile your talk. Therefore figures must be clearly labeled, and all terms and notation must be clearly defined before use.
8. If you project figures or words onto the cave wall, omit anything that you do not plan to explain fully. Describe; do not read.
9. Praise those whose work in the same crops have contributed to your harvest.
10. Do not hide your own weaknesses, or the gods may expose them for you on their own terms. The gods have not selected you to sell used chariots but rather to educate.



A. Kercheval

Credits

Author photo is courtesy of the author.

Advice for the Campus Interview

Amanda Folsom and Alex Kontorovich

Introduction

Congratulations, you're invited for a tenure-track job talk! What should you expect for your visit, and how should you plan your lecture? We will decompose our discussion according to whether you are interviewing for a predominantly *research* versus *teaching* position. Some of our advice

Amanda Folsom is a professor of mathematics at Amherst College. Her email address is afolsom@amherst.edu. Folsom is partially supported by NSF grant DMS-1901791 and NSF CAREER grant DMS-1449679.

Alex Kontorovich is a professor of mathematics at Rutgers University. His email address is alex.kontorovich@rutgers.edu. Kontorovich is partially supported by NSF grant DMS-1802119, NSF CAREER grant DMS-1455705, NSF FRG grant DMS-1463940, and BSF grant 2014099.

DOI: <https://dx.doi.org/10.1090/noti1974>

will overlap with more general suggestions for how to give a department colloquium; for the latter, the reader is invited to peruse, e.g., [Ell10, Ger97, Gow07, Hal74, Kra13, McC99, Tao09].

Research University Interview

Pre-interview

The single most important bit of advice happens well before the job talk:

Prove the absolute best theorems you can!

If you want an offer from a research university, there is simply no substitute for first-rate work. There are lots of other places to read advice on your research program; we won't rehash such discussions here, but feel it is important to restate the obvious.

Next, also well before the job talk: When you apply to a position, it is important to try to find someone in that department close to your research (ideally someone you know personally). If it's a job you really want, consider emailing them to let them know you've applied. While the relatively recent appearance of MathJobs.org has been a blessing for applicants and letter writers, it has increased tenfold the number of files delivered to hiring committees. The odds of winding up on a short list may be greatly increased by personally reaching out to someone on the tenured faculty close to your work. Even if they're not themselves on the search committee, they can forward your file to the committee members. Or they can do nothing; it's not necessarily an imposition to write and say that you've applied.

The Visit

Here is a bit of game theory: if you were invited, then you were invited by somebody. That is, there is a person or group of people in the department already advocating for you; they're most likely people you already know or, at the very least, people close to your research.

The people closest to your research are not the ones you need to impress!

They're probably already impressed with you or else they wouldn't be trying to convince their colleagues to hire you to their department. The people you do need to impress: everyone else, especially those far from your research area.

A typical visit will involve meetings with the department chair, the head of the search committee (often but not always the chair), and perhaps the director(s) of the graduate/undergraduate program(s). The chair/search head will want to know whether you seem like a collegial person to have in the department; the program directors will want to get a sense of whether you can teach introductory and advanced courses in the undergrad/grad curricula. You may be asked to speak with a dean, as well as other members of the faculty interested in conversing with you one-on-one.

Our best advice here: just be yourself. Do be curious about the department and faculty life: where do people live (how are the commutes? schools?); what is the grad student to faculty ratio (how many PhD students, on average,

should you expect to supervise?); what is the postdoc to faculty ratio (how often will you get to hire a postdoc in your area?); is there an active daily department tea (do people generally get along and enjoy casual discussions?); is there a seminar in your field (and are there perhaps internal funds for such, or should it be supported by outside grants?); what is the sabbatical schedule like (one semester after six semesters of teaching? or after six years? at full salary or 80% or 50%?); what is the teaching load; what are some courses a typical tenure-track faculty member in your area would teach; what does typical department and university service entail; etc., etc. You may have already researched some of these things before the interview, but further discussion can show genuine interest in the department. They will want to know that if they decide to make you an offer, you'll at least seriously consider it. That said, we recommend you **not** start negotiating before you're made an offer. Questions to avoid include: can I get my teaching load reduced in the first few years; how big of a startup package is typical; what are the starting salaries—these are all of course very important but should be postponed until *after* the department decides to hire you. Sometimes the interviewer will offer some of this information without prompt, which is fine, but there is no point in requesting it until the time is right.

The university's "family policies" are a delicate subject that (if relevant to you) we recommend you investigate on your own but not necessarily discuss with other faculty on the visit. For example, what are the procedures for parental leave (such as for the birth or adoption of a child)? These might range from a full semester teaching leave at full pay down to a few weeks off. Another example is whether there is a Tuition Remission program for dependent children of faculty. These range from nothing at all to very generous (e.g., full tuition at any accredited university for the entire duration of study and no restriction on the number of children). Depending on your situation, such protocols can make rather dramatic financial differences, so it may be tempting to ask. But they are usually found in the university's faculty handbook. It is illegal in the United States to ask the interviewee questions about family issues, so they may be uncomfortable in answering them, even if you initiate the discussion.

The Lecture

Ah, the main event. You have successfully navigated the various meetings, managed not to spill coffee on your shirt at lunch with the search committee, and now the entire department has gathered in the colloquium room, eagerly awaiting your lecture. Let us recapitulate some of the advice in the aforementioned references on good lecturing, emphasizing the parts most relevant to a job talk.

First we should repeat the old adage:

*There are no rules for a good talk;
there are only good talks.*

What we mean by this is that two good talks might be constructed using totally different "rules" or recipes, not to

mention that people have different tastes, so "good" here is very subjective. One must of course balance difficulty (trying to impress the audience) versus accessibility, careful details versus heuristic ideas, being engaging/charismatic without coming off as shallow/superficial, etc., etc. If there are any rules at all, it is perhaps what **not** to do.

For illustrative purposes, let us suppose that your work is about automorphic representations. You could begin your lecture with: "Let G be a reductive algebraic group over a number field K and let \mathbb{A} be the adèles of K ." This is how you have heard countless seminar and maybe even colloquium speakers begin their lectures. These are the most basic objects in your field, and everybody knows their definitions seemingly from birth. This is also, we caution, the surest way **not** to get hired!

Perhaps we're wrong. Perhaps the department has already decided that they are hiring in automorphic representations, and they've heard three talks already that started like this, and they'll hear two more after you. Nobody except the number theorists will understand a word, and the department will simply rely on the number theorists to choose their favorite candidate. Is that really how we want the culture of mathematics to be?

If not, then your target audience should probably include, say, the PDE people (or some other research area very far from yours). These are still smart, professional mathematicians, but you should not assume they know anything about the history of your subject, why you care about the objects you study, or even the basic definitions/goals/desires/dreams of the people working in your area.

Even (or perhaps, especially) if you state the precise (technical) definitions of the objects playing a central role in your work, these will go in one ear and out the other. It is far better to explain things that people already know than to leave many in the audience behind. The following is something you do not have to do when actively researching but is just as important for communicating your results (and field) to outsiders:

*What is the absolute simplest example of your theorem,
or a related theorem (not necessarily yours),
using basic objects that most undergraduates know?*

Drop "reductive algebraic group" and just say GL_n . Don't just give a laundry list of theorems you've proven; this may be tempting (to advertise your work), but it usually makes a terrible talk. Tell a story. Why do you do what you do? Any subject that became a "field" did so because a number of people decided certain classes of questions were interesting. What are those questions? What are some of the basic tools? Motivate, motivate, motivate. If those far from your work leave your lecture having finally learned something interesting about your field (even if they learn nothing about your actual contributions to the field), they'll be grateful and hopefully also eager to have you as a colleague.

Post-Visit

Beyond perhaps sending emails to the people you met to thank them for the conversations (again, only if you want to), we recommend doing nothing after your visit. Typically, the department will interview other candidates and go to other job talks, the search committee will meet, and maybe the whole department will meet and vote. Even if you are not the first-choice candidate, you may still get an offer, so don't despair; put the entire process out of your mind and let it run its course. The only deviation from this is that you might decide (or be asked) to keep the chair (or whoever is your contact) abreast of any other developments on your end; e.g., if you are invited for an interview at place Y, even after your interview at place X already happened, there are reasons why you may want to let place X know. Lastly, as soon as you know for sure that you will not accept an offer at place X, please withdraw your application.

Liberal Arts College Interview

Much of the above advice stands, with some important amendments.

Pre-interview

Let's suppose you're either working towards your PhD in mathematics or have recently obtained it. You've spent a lot of time in recent years getting well acquainted with your specific area of research in the confines of a research university. But if you find yourself gravitating towards the idea of a job at a liberal arts college or predominately undergraduate institution—a different kind of environment—just how exactly do you go about getting one? Research is important at a typical liberal arts college, but perhaps in a different way than at your standard research university. In most cases, you're still going to need to submit a research statement with your job application to a college, and developing your research program will still be important and a part of tenure criteria. How important is it and how do you get tenure? Well, there's enough to say about that that it's better left for another article (see also our "Final Thoughts" below), so let's move on. Suffice it to say that you should not ignore your research if striving for a position at a college.

And, of course, you should certainly be invested in the teaching and mentoring of undergraduate students. You'll also need some evidence of this. An obvious way to do this is to have taught your own undergraduate courses, to have strong teaching evaluations to demonstrate your success in the classroom, and to have a strong teaching letter to go along with your application. Your PhD advisor's letter with your job applications may comment a bit on your teaching, but you'll probably want more ammunition. For example, you might ask designated teaching faculty in your department to pay you a classroom visit a few times throughout the semester, discuss your teaching with them, and ask them for a teaching letter. You might also get involved with your institution's campus-wide center for teaching and learning (many schools have such a thing) in

order to think about pedagogy in a structured and more formal setting. If you haven't had the opportunity to teach your own class, perhaps you've TA'ed and have good evaluations or classroom observations to back it up. Perhaps you've worked with undergraduates on research at an REU or similar program; led a student seminar or reading course; or worked in a leadership, mentoring, or teaching capacity at another kind of program either within or outside your current institution. There are many teaching and outreach experiences and activities like these to get involved with as a graduate student, postdoc, or beginning faculty member (really, at any stage of your career).

If you find yourself in grad school with very minimal or no teaching experience but have your eyes set on a long-term position at a college, then chances are you'll need to get some more of this type of experience under your belt (with documented success) before such a place would be ready to hire you. Some liberal arts colleges hire tenure-track math faculty right out of grad school, and some do not. Even with the goal of a long-term job at a college, you may want to be open to the possibility of a short-term position or a postdoc before a tenure-track position to gain more experience. While taking a temporary visiting position or postdoc with your eyes set on a tenure-track position at a college may feel like a setback, it may be a good time to further develop your teaching (and research) portfolio and transition from the predominantly research-dominated environs of graduate school to the liberal arts college setting.

The Visit

As we said, much of the advice in the previous "Visit" section stands. During an interview at a college, though, chances are that you will meet with many, sometimes all, members of the department, even if they're not in your area of research. As part of the interview, you'll probably also meet with the dean or another administrator, sometimes Human Resources, or other members of the college who may not be in your department. And you may very well have scheduled time during your visit to meet with the undergraduate students. Presumably you will be given a schedule or at least a description of whom you will meet with during your on-campus visit. As we said above, be yourself and be prepared—be prepared to talk about your teaching, your research, and your professional activities to faculty, experts, students, and administrators alike. Sometimes on-campus interviews at teaching colleges last more than one day; the college as a whole really wants to get to know all sides of you as a prospective faculty member. Counter to our advice for the research university visit, in this setting it's probably not just "prove the biggest theorems or bust." Colleges are tight-knit places. Ask questions, be curious, and be interested.

The Lecture

Every department is different, but chances are that you should not give a research university-style job talk at a liberal arts college on-campus interview. It's important to

know who your audience will be. Will there be only faculty in attendance? Or will there be undergraduates present? Will they all be math majors or not? If the search chair has given you any instructions about your talk, then follow them. For example, if the instructions are to give a talk accessible to undergraduates who have only taken calculus, then you should really do this! It might be tempting to pepper in your fanciest and most technical theorems—after all, aren't you supposed to impress the department?—but this could easily backfire and become a turnoff. Teaching is probably prioritized at such a place, and (if relevant to the talk instructions you're given) demonstrating live and on the spot that you can effectively reach the undergraduate population can really speak volumes and add a lot to whatever your glowing two-dimensional teaching letter or past student evaluations say.

On the flip side, don't overexplain trivial things, but instead try to hit that sweet spot by giving a talk that's accessible but not totally watered down and is also stimulating and intriguing but not over your presumably mixed audience's head. We will stress again that what this means can absolutely depend on school, department, and audience—giving a successful liberal arts college job talk at a school that primarily enrolls students who are underprepared or from underresourced high schools could be quite different from giving one at one of the country's most selective colleges. Be prepared to elaborate if a question is asked, in any direction—be ready to break down a complicated concept into something simpler and more tangible, or be ready to extrapolate into the deeper or more technical meaning of something. (This advice applies to giving talks at research universities and to general classroom teaching as well.)

It's not necessarily impossible to talk about your research to undergraduates, but it can take a lot of forethought and careful planning to do so successfully (but you knew this, because you're interviewing at a college and you care about pedagogy). Some departments at teaching colleges may not actually require you to talk about your research during the job talk and might give you flexibility on the topic. If you decide that speaking about your thesis on automorphic representations is not a good fit, then perhaps there is another related undergraduate-accessible problem you're familiar with—an interesting one that undergraduates could really sink their teeth into and get excited about. If this type of flexibility on talk topic is allowed, then you shouldn't worry about not presenting your deepest research in the job talk; the department and search committee know what they're doing. They read your file and will likely find time to chat with you about your research in other settings during the on-campus interview.

Whatever you end up speaking about, you should practice giving the talk before you get to campus. Chances are this is not the style of talk you are accustomed to giving, since you've been holed up in your cubicle learning the ins and outs of reductive groups and TA'ing linear algebra.

Practice, practice, practice. If you're supposed to be giving the talk to undergraduates during your interview, you could try to round up some undergrads and trusted colleagues at your current institution to give a practice talk to and ask for feedback (does it make sense? is it interesting? engaging?). Perhaps there's a center for teaching or designated teaching faculty in your current institution or department with which you could consult. And of course, pay attention to timing. There's nothing worse than not planning carefully enough so that you're still five minutes away from the big punch line when it's time to end; but at the same time, you don't want to rush through your talk due to nerves and end fifteen minutes early. Audience questions, nerves, tech issues, and other factors can disrupt the timing of the live delivery of a talk. Be ready to improvise if needed so you can end the talk on time, having said most, if not all, of what you wanted to say.

Final Thoughts

While most higher ed institutions in the United States are labeled as a university or a college on paper, it's important to remember that the system is not wholly binary. The advice above is not necessarily two-sizes-fit-all, and some advice from the research university section may very well belong in the liberal arts section and vice versa. Moreover, it's not true that all universities predominantly emphasize research, and all colleges predominantly emphasize teaching while deemphasizing research. There are many different kinds of institutions, and how much of a research culture versus a teaching culture exists can vary by school or department, even if the word "university" or "college" is attached to the name of a place. There are also teaching jobs at research universities such as lecturer positions, and there are liberal arts colleges where high-quality research is a very real part of the job expectation and campus culture. So it's important to do your homework when preparing for an interview and know what kind of a position you're being considered for, in what kind of a department, and at what kind of an institution. We wish you the best of luck, dear reader, in your quest to land one of the most rewarding jobs on the planet!

References

- [Ell10] Ellenberg J. Tips for giving talks, 2010. <https://quomodocumque.wordpress.com/2010/09/23/tips-for-giving-talks>. Accessed July 15, 2019.
- [Ger97] Gerosh R. Suggestions for giving talks, 1997. <https://arxiv.org/abs/gr-qc/9703019v1>.
- [Gow07] Gowers T. My favourite pedagogical principle: examples first!, 2007. <https://gowers.wordpress.com/2007/10/19/my-favourite-pedagogical-principle-examples-first>. Accessed July 15, 2019.
- [Hal74] Halmos PR. How to talk mathematics. *Notices Amer. Math. Soc.*, 21:3:155–158, 1974.
- [Kra13] Kra B. Giving a talk. *Notices Amer. Math. Soc.*, 60:242–244, 2013.
- [McC99] McCarthy J. How to give a good colloquium, 1999. <https://www.ams.org/ams/gcol1.pdf>. Accessed July 15, 2019.

[Tao09] Tao T. Talks are not the same as papers, 2009. <https://terrytao.wordpress.com/career-advice/talks-are-not-the-same-as-papers>. Accessed July 15, 2019.

ACKNOWLEDGMENTS. The authors would like to express their gratitude to Rob Benedetto, David Cox, Jordan Ellenberg, Erica Flapan, Sharon Garthwaite, Bryna Kra, Steven J. Miller, and Steve Strogatz for numerous thoughtful comments that improved an earlier draft.



Amanda Folsom



Alex Kontorovich

Credits

Photo of Amanda Folsom is ©Amherst College.

Photo of Alex Kontorovich is by Laurie DeWitt from Pure Light Images.

Tips for the Employment Center

Katelynn D. Kochalski

Many people who have been on the academic job market have a story to tell about the Employment Center. What exactly is the Employment Center, and how can you set your best foot forward while you are there?

What Is It?

Before deciding whom to invite for an on-campus visit, many schools conduct preliminary interviews at the Joint Mathematics Meetings, and many of these take place at the Employment Center. If you apply for a position at one of the institutions that does interview at the Employment Center, then most often someone from the hiring committee will contact you, likely by email, to schedule a conversation. Other interviews with potential employers will take place over the phone or Skype. Similar to phone or Skype interviews, these Employment Center interviews usually run between 20 and 30 minutes.

Katelynn D. Kochalski is an assistant professor of mathematics at SUNY Geneseo. Her email address is kochalski@geneseo.edu.

DOI: <https://dx.doi.org/10.1090/noti1973>

The Employment Center itself is usually located in one of the large rooms at the conference center. It is partitioned into smaller sections: one is designated as the waiting area, while another area, populated by tables and chairs, is where the actual meetings between applicants and representatives from hiring committees take place. The interview room or rooms have an open layout, generally with no dividers between the tables. In particular, your meeting may occur in close proximity to a number of other sessions between people who are talking with representatives from different schools. This of course can be distracting, and it is important to stay focused on your own interview. Stay poised and concentrate on what you have prepared.

Preparing

You may have a number of different interviews in the same day. But remember that every job is different. Make sure to research each institution so you can ask and answer questions thoughtfully. It's a good idea to look for details about the institution you are applying to, their location, and the job ad. Record your findings in a notebook or on flashcards to keep handy and refresh your memory right before the interview. You can learn a lot from their department website. For instance, the college mission statement may help you find a meaningful answer that resonates with both you and the interviewer when asked why you want to work there. Showing that you are knowledgeable about the location, the school, their students, and the type of institution can support the persona you put forward in your application materials so that your narrative is consistent. While schools interviewing at the JMM tend to be more teaching-focused, you should definitely be prepared to answer questions about your research and how you intend to balance your teaching and research responsibilities. But keep in mind that you will likely be talking to people outside your field. Your answers should be tailored to nonexperts.

If you've done your research you've got a lot of information to keep straight, which is an important challenge. Start the research process early. It isn't enough to make the flashcards or write out some facts in a notebook and then forget about it until the day of the interview. Spend additional time preparing and studying the information. Bring your resources along with you when you run errands, and look them over while you wait in line or get your oil changed. If possible, put a bit of a buffer between interviews so you have time to reflect and make notes about each one and can look over your notes about the next institution.

Not all interview questions are designed to showcase you at your best. No matter how difficult the question is to answer, you want to be honest and answer the question that was asked. Use it as an opportunity to show the committee how your unique experiences have helped you grow. For instance, what do you say when an interviewer asks you about a teaching experience that didn't go well and how you overcame it? It's hard to admit to such a thing during