

A Ph. D. is **not** enough!

(Based on the book by Peter J. Feibelman)

Peter D. Miller

Department of Mathematics
University of Michigan

February 6, 2009 / Math 501

Outline

- 1 A Vignette
- 2 Choosing a Thesis Advisor and a Postdoctoral Position
- 3 Giving Talks
- 4 Joining Professional Organizations

Outline

- 1 A Vignette
- 2 Choosing a Thesis Advisor and a Postdoctoral Position
- 3 Giving Talks
- 4 Joining Professional Organizations

Vignette: Focus versus Scope

Consider the true story of F., who

- Found a thesis advisor early in graduate school, and immediately began work on a problem of upper atmosphere physics.
- Did strong work, but without awareness of motivation, publishing a paper before even starting thesis work at age 22.
- Consciously switched gears to do a thesis project requiring mastery of new tools and methods (modern quantum physics). Easily acquired technical skills and made rapid progress, but again without understanding “why” or what made the work “cutting-edge”.
- Continued in the same vein through graduation. First seven papers each in a different area; F. relied in each case on a senior faculty member to indicate which problem is good to work on.
- After some postdoctoral positions, was on the market for a permanent academic job. Realizing the need for good letters of recommendation, agreed to give a seminar talk. F.’s talks to date reflected the above approach to work.

Luckily, F.’s supervisor saw an early version of the slides, and was compelled to offer advice.

Breakout groups: What advice do you think F. was given?

Advice F. was given

Here is what F.'s supervisor advised:

- 1 There has to be a theme to your work — some objective — something you want to know. There has to be a story line.
- 2 If you know why you have chosen to work on a particular problem, it is easy to present an absorbing seminar.
- 3 Rehearse your talk in front of one or two of your peers and/or professional supporters. Choose listeners who will not be shy about asking questions and giving constructive suggestions.

Remember: **no technical skill is worth more than knowing how to select exciting research projects.**

Outline

- 1 A Vignette
- 2 Choosing a Thesis Advisor and a Postdoctoral Position
- 3 Giving Talks
- 4 Joining Professional Organizations

Benefits and Pitfalls of a Prominent Advisor

Choosing a prominent researcher as an advisor is a good idea but **not** because brilliance is “transferrable” (it is not). Rather, it is a good idea because

- Your advisor will have many “connections,” so you may be able to get help on many subjects during your thesis work. You may also be able to get help via this network after you’ve graduated, and even if you may not deserve it.
- Your advisor will be sufficiently senior to stay out of your limelight (not compete with you). More junior faculty members may still have something to prove.

A senior professor is less likely to leave the university during your thesis work, but is more likely to retire or become ill.



Benefits and Pitfalls of a Prominent Advisor

Some potential pitfalls of a prominent advisor:

- May not be easily accessible to students.
- May not give real guidance, especially on nontechnical (career/life) issues.
- May not be comfortable talking with students.

If a prominent researcher has many students already, it is easier to determine your possible fate. Talk with them and then ask yourself this question: **Do they see the “big picture?”** Keep in mind that a group of students can develop greater awareness by mutual interaction, and may not need the everyday input of their advisor. Each student may be working on a detail but should be able to tell you the greater story of the research.



Birds and Frogs

Finally, are you a “bird”, or a “frog”? What about your potential advisor(s)? See the article by Freeman Dyson in the *Notices of the AMS*, **56**, number 2, 212–223, 2009.

Choosing a Postdoctoral Position

Key point: **Understand your interests and how they may differ from those of your potential employer.** Postdoctoral positions are cheap labor and relatively low-risk for employers, so make sure you will be mentored! For employers the most important qualifications of a postdoctoral candidate are:

- That you present your thesis research well, implying that you will be a good spokesperson for your supervisor's research program.
- That you have not taken overly long to finish your degree (postdocs are short-term positions and you will be expected to produce results during this time or your next job will be hard to come by).
- That you should be interactive, making the department or research group more lively.

Keys to Success as a Postdoc

Once you have found a postdoctoral position, the keys to success are:

- **Finish something.** Your first priority as a postdoc is to have something to give talks about when you go job hunting.
- **Make yourself known and useful.** Don't hide in your office. Talk to other researchers and faculty. Be friendly, and forge connections.
- **Do not be a slave to your postdoctoral advisor.** During a postdoctoral appointment you are expected to begin to establish your own research program, your own personal plan of attack on interesting problems. Don't let somebody else determine your image.

Outline

- 1 A Vignette
- 2 Choosing a Thesis Advisor and a Postdoctoral Position
- 3 Giving Talks
- 4 Joining Professional Organizations

The Presenter as a Showperson

- A seminar is not a theater piece, but the speaker **is** putting on a show.
- Listeners are investing their time; they wish to learn something but also expect to hear a good story with a beginning, a middle, and an end.
- Listeners will feel uncomfortable if you:
 - Explain something poorly or wrongly.
 - Have obvious errors or misspellings on your slides.
 - Finish too early or, **especially** too late.
- Disappoint your listeners at your peril: they may dismiss you or your ideas and never discover how good you really are — just because you put on a bad show.

The Introduction

- A fundamental principle in preparing a talk is: **never overestimate your audience**. Even experts like to hear a story they know well, if it is well-told. It makes people feel good if they understand something in a talk.
- The introduction should set the tone for your lecture; you want to give the audience the impression
 - That you know your field.
 - That you have intellectual curiosity that will make you a valuable colleague.
 - That you enjoy doing research.
 - That you plan to convey some useful and interesting information.
- It should describe the “big picture” of your work.
- **Until you are well-established, you should think of every talk as a job interview talk.**

Stagecraft

- Project a reasonable level of self-confidence in speaking.
 - Too little (quiet voice, not making eye contact with audience) and you may risk not appearing excited about your work, or not gaining the trust of your audience inviting many derailing questions.
 - Too much (assuming too much background knowledge, talking too loud or too fast) and you may risk coming across as a “fake” trying to trick your audience rather than engage them equally.
- Timing is everything. Practice your talk in front of others. Know exactly how long it takes you to get through a slide.
- Consider designing a “modular” talk, so you can add or delete modules to handle disruptions in your planned timing beyond your control (e.g. many questions).

To Outline, or Not To Outline

Should you have an outline slide that you discuss at the beginning of your talk, and perhaps revisit throughout the talk at key junctures (beamer makes this easy)? Or should you avoid this? It depends on the type of talk.

- It is fine to have an outline slide, even a recurring one, if your talk is an hour (or so). Just don't go overboard telling people what you are going to tell them before you tell them! Timing is everything!
- For short talks (e.g. non-plenary talks at AMS meetings, which are supposed to be 25 minutes including questions), don't waste any time with an outline slide. Just start telling your story — there's not much time!

But, you should **always** have a simple title slide on which you credit your co-workers and any supporting agency.

Technical Matters of Slide Preparation

- There is a long tradition in mathematics of “chalk-talks”. But when you wear your interdisciplinary “hat”, you should almost always give a media talk, either with a computer or with overhead transparencies. A good backup plan is to carry transparencies of your talk with you just in case the technology fails.
- Feibelman’s book was published in 1993, and the world has changed since then. He overemphasizes the risk of looking “too flashy” with a well-prepared media talk. But do **not** include high-tech trickery (e.g. pointless animations) just because you can. It is distracting.
- Keep the font size as big as possible.
- Think carefully about every bit of mathematics you include. Will the audience be able to absorb the equations?



Summary of Advice for Giving Talks

- 1 Your seminar is a performance. It needs to be carefully planned and thoroughly rehearsed.
- 2 Present yourself confidently. Act as though you have enjoyed doing your research and that your results are exciting to you.
- 3 Respect your audience. They are spending an hour to hear you. They want to understand what you have to say, even if your specialty is not theirs. They do not want to be “snowed,” nor do they want to be treated as “experts” in a field where they really are not.
- 4 Do not waste your time with filler. Make sure each slide pushes your story forward.
- 5 Make sure your slides are pleasing to the eye.

Outline

- 1 A Vignette
- 2 Choosing a Thesis Advisor and a Postdoctoral Position
- 3 Giving Talks
- 4 Joining Professional Organizations

Joining Professional Organizations

You should take advantage of discounted annual dues for graduate students and join one or more professional organizations. The key organizations for our profession (mathematics and applied mathematics in general) are:

- The American Mathematical Society (AMS)
www.ams.org. There are also national societies in many other countries, but this is where you're living at the moment.
- The Society for Industrial and Applied Mathematics (SIAM)
www.siam.org. This is an international society.

Benefits of Membership

What are the benefits of membership?

- Subscriptions to certain publications that include articles as well as advertisements for conferences, jobs, etc.
- Discounted fees for conference registration.
- Discounted prices on books.
- Direct access to certain funds, for conference travel costs or covering the expenses of a prominent speaker to visit you.
- Your dues support good scholarly activity, including scholarships and fellowships.