

Top Ten Ways to Lose an Audience

When we were asked to write an article on how to give a talk for the *SIAM News* career column, we found that we could not agree on many (any?) points! The truth is that different styles work for different people. But we easily agreed on how *not* to give a technical talk—and quickly confirmed that our pet peeves are shared by many of our colleagues. So here's our top ten list of ways to go wrong when giving a talk.

Careers in the Math Sciences

By Tamara Kolda and Virginia Torczon

#10. Look at the screen rather than at the audience.

If you don't make eye contact, the audience is far less likely to pay attention—in part because you won't notice what they do in any case. Moreover, if you are looking at your slides, you may be tempted to simply read them to the audience. (Ideally, your slides have been crafted so that they *augment* rather than *replicate* what you are planning to say.) When you don't look at the audience, you also miss essential cues, such as clearly puzzled faces or hands raised for questions. Last but not least, the audience won't be able to hear you well—if at all—because you're facing the wrong way.

#9. Limit your color scheme to black on white or white on black.

You might think that because an appreciable percentage of mathematicians grew up listening to board talks, restricting yourself to white text on a black background, or black text on a white background, would make them feel right at home. But you'd be wrong. Simply put, the use of color almost always makes slides more interesting. When introduced thoughtfully, color clearly emphasizes key ideas and establishes connections between related concepts. But color should be used judiciously. Riotous color can be worse than none at all: It can do nothing to reinforce your main points and can even confuse or distract the audience.

#8. Make your fonts too small, overcrowd your slides, and use colors that can't be seen when projected.

Choosing fonts of sufficient size and in a clean, simple typeface is essential. This especially applies to labels for plots and graphs. Avoid crowded slides; material that extends into the margins may simply be cut off when the slides are projected. Small fonts are often a byproduct of a speaker's attempt to cram too much material onto a single slide, a temptation even for experienced speakers. To alleviate the problem, try to convey the same information in a smaller space. For instance, avoid extracting entire sentences from your papers. The following sentence*:

Suppose that there are n coupons, from which coupons are being collected with replacement. What is the probability that more than t sample trials are needed to collect all n coupons?

is pithier and easier to digest as:

Coupon Collector's Problem: Given n coupons, how many draws (with replacement) are needed to collect them all?

Until you get the hang of preparing legible slides, here's a good practice to follow: After completing the first draft of a new talk, flip through your slides on a projector, in a small room if you'll be speaking in a contributed session at a SIAM meeting, in a large room if you're preparing for an interview talk. Stand at the back of the room, and look for common problems (colors that don't show up well or aren't distinguishable, fonts that are too small, lines in images that are too thin, illegible text superimposed on graphics, etc.). Then go back and fix them!

#7. Use poor graphics and gratuitous animations.

Everyone admires beautiful slides. Graphics and animations can both make slides look lovely and illuminate technical concepts. They must be used carefully, however. Simply cutting and pasting a figure from a paper rarely works, because the fonts and line widths are typically too small for projection. It's much better to take the time to regenerate a picture from scratch using heavier lines and larger fonts. Tables are deadly and almost always can—and should—be replaced by graphs. And let's just say that you make gratuitous use of flying text or spiraling figures at your peril.

#6. Use too many acronyms and math symbols.

Do not expect your listeners to be able to remember more than a few new-to-them variables or acronyms across multiple slides. A talk is not a paper; a reader can refer back, when needed, to the introduction of acronyms and notation. You do get "standard" notation and acronyms for free. For instance, anyone who has taken even one numerical linear algebra course is familiar with systems of linear equations expressed in the form $Ax = b$ and probably knows that SVD is the acronym for the singular value decomposition. But if you insist on using $W\phi = \gamma$ to represent the linear system of interest to you, you're adding three new symbols to the mental overhead for your audience and are thus rapidly approaching the limit on new notation they can be expected to remember. And keep in mind that what is standard in one field may not be in another. In linear regression, for instance, the usual representation for linear systems is $X\beta = y$.

#5. Fail to put your work in context.

It's important to explain up front why your work matters. Regardless of the audience, your task boils down to answering such questions as: Does your work address an important problem? What was the state of the art when you began your work and how has it changed? This is particularly important for an audience that is unfamiliar with your research area—they'll tune out if you insist on telling them about obscure

(to them) mathematics that doesn't help them understand your talk. People tend to remember more about work that relates to an application they care about. For the experts in the crowd, you will need to stress how your work fits into the broader context of the field. Be sure to give specific citations; generally, last names of the authors and year of publication are sufficient. If one of the people you generously cite (no fawning, please) is in the room, you may make a professional friend for life.

#4. Spend too much time on background material.

Although it is critical to place your work in context, you need to leave ample time to get to the contributions *you* have made to the field. It's a fine balancing act, but your goal should be to give only enough background for the audience to understand the rest of your talk. And, above all, avoid spending too much time reviewing standard material or reviewing your own past work—few things are more boring than sitting through a review of material you've seen many times before.

#3. Create your slides on the plane on your way to give the talk.

To put things in context, an m -minute talk to n people will consume $m * n$ person-minutes. It's only courteous to put at least that much time into preparing the talk! And less experienced researchers need to double or triple the estimate. So, if you're giving a new fifteen-minute talk to two dozen people at a conference, expect to spend at least one full day preparing for it (don't forget a trial run with a projector to check your slides' visibility!). A fifty-minute seminar talk to sixty people works out to *fifty* person-hours, so it's not unreasonable to spend at least a week on the talk—especially if it is a hiring talk. The point is: You don't want to waste your audience's time. To that end, allow yourself ample time to develop a coherent story, to prepare graphics that convey complex ideas (including a careful reworking of any graphics from your papers to ensure that they project properly), and to do a few practice runs in order to fine-tune both your slides and your presentation. Trust us, a seasoned audience will be able to tell, and will appreciate, how much time you've put into preparing your talk.

#2. Exceed your time limit.

Even assuming that an audience would love to listen to you forever, many members will have obligations that prevent them from doing so—other talks to attend, classes to teach, children to pick up, etc. More to the point, you're just not that interesting! Sure, your listeners are happy to allocate 15 or 50 minutes to your talk, but if you go over the limit, don't be surprised if many of them physically—or mentally—depart.

#1. Deviate from your core message.

As a practical matter, you can expect to convey one primary take-away message, supported by only a few of your many research contributions, in the course of a talk. You certainly shouldn't try to tell the audience everything you've done or precisely what you've written in your paper(s), down to the last detail. Again, a talk is not a paper; members of the audience do not have the luxury of absorbing the details at their leisure.

For a short conference or workshop talk, your core message needs to be restricted to a single major contribution. For an interview talk, you usually can—and should—include two or three major results; but taken together, these individual results should form a coherent whole that convinces influential members of the audience of your research credentials.

We have a colleague who insists (and we agree): "Every talk is an interview talk." Your goal for any presentation should be to end with the audience firmly on your side, wanting to know more about both you and your work.

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