

The Woman Physicist's Guide to Speaking

Heidi Newberg

One of the most important skills for scientists regardless of gender is giving lectures. Public speaking is a learned skill that requires practice, effort, and confidence building. Lectures are a tremendous opportunity to communicate accomplishments to other scientists and to influence scientific discovery.

Aim for your audience

When preparing your presentation, it is important to decide what you would like your audience to remember after it is over. Some people are very good at listening and will hear and understand every sentence you utter. Most people, including me, lapse in and out of attention during a presentation. One way to reach those with questionable listening talent is to outline your main points up front, when the audience is still awake. Then, spend the body of the talk explaining the main points, being sure to take sufficient time to explain each graph, picture, or idea. End with your conclusions, which reiterate the main points you want to get across; keep them all on the same visual if possible. Each visual should be self-contained and self-explanatory, since some people who don't listen well can and will read everything on the slides. The labels on all plots should be large enough and the symbols defined well enough that the person who returns to consciousness in the middle of your description of the plot can attempt to catch up with you. Make sure your list of conclusions is still visible at the end of the talk, which you end by saying, "I will end there," or "Are there any questions?" Many people in the audience are going to search themselves for questions at this point, and the conclusions will jog their memories as to what you have said. The list aids in the formulation of questions; the questions and answers are an important component of the talk.

Beginning speakers should practice their talks before giving them—once for hour-long talks, three times for 20-minute talks, and 12 times for

5-minute talks. You should practice your talk once in front of friends or coworkers who can offer you constructive suggestions. Avoid being defensive if there is criticism, and revise your talk in any way you think is beneficial. These practice talks are often more difficult than the public talk because you feel silly explaining your project to a group of people who know most of the information already, but they are an important part of the learning process.

Many seasoned physicists finish working on their talks the night before or on the plane headed to the conference, but they only get away with this after long practice. Good speakers make all of their most important points in the allotted time, with sufficient time left over for questions. The shorter the talk, the more planning is required. If the presentation is being made with transparencies, the important points can be written on Post-It notes attached to each vue-graph as a reminder. PowerPoint images can be printed out in thumbnail size with reminders written next to each image. Alternatively, you can write your points on 3 × 5 cards and hold them in one hand.

Always test your visuals before the presentation to allow time for changes if necessary. If possible, the visuals should be tested in the same room and with the same equipment with which the presentation will be given. Photographs are often difficult to see on overhead transparencies and black transparencies heat up quickly. Computer-projected (for example, PowerPoint) images often have different colors on your laptop than from a projector, and innumerable technical problems can be encountered with connection cords, screen resolutions, operating system incompatibilities, movies that will not load or play, and so on. Sometimes conference organizers request an electronic copy of the talk ahead of time so it can be loaded into the local equipment. Sometimes the speaker brings the talk on her own laptop. As a backup, always have copies of computer-projected talks on separate electronic media (CD, memory clip, and so on) or available for electronic transfer over the World

Wide Web. Alternatively, the most important visuals can be printed out as transparencies. If you are traveling to speak, your talk should come with you in your carry-on luggage.

Now hear this

The first thing that happens when you stand up to speak is that the organizer or session chair hands you a microphone. Women typically do not have deep booming voices that carry over lecture halls, and should use amplification at every opportunity; there is nothing worse than preparing and delivering a great but inaudible lecture. Some microphones come with an alligator clip that is designed to attach to the front of a button-down shirt such as most men wear when giving talks, and a battery pack clips to the pocket, belt, or pants waist that male speakers wear. Women who are not prepared for the audio assistance often start their talks with an awkward exchange with the session chair while they try to figure out how to attach the audio apparatus.

In most cases, it is acceptable to wear anything from jeans and a T-shirt to a stylish suit with a skirt. Clothing should be carefully chosen to be comfortable and to accommodate a microphone. If you wear a skirt or pants made of a sturdy fabric, then you have a waistband on which the battery pack can be clipped. When speaking, I usually wear a wool or cotton skirt, a cotton button-down shirt, and a jacket or vest. If the alligator clip cannot be attached to my shirt for any reason (old-fashioned styles can only be clipped in the direction that men's shirts button), it can be clipped to the jacket or vest. Fashion boots can be easily worn with a skirt and, if chosen well, are a comfortable and secure alternative to heels, which are a trip hazard when you are nervous and need to walk on polished floors crisscrossed with temporary wiring. You should not wear distracting clothing when giving a talk. After all, you are already the focus of attention and you would like to have the audience concentrate on the physics.

Young women often make the mistake of beginning their talks with an apology or self-deprecating comment

Heidi Newberg is an associate professor of physics at Rensselaer Polytechnic Institute in Troy, New York.

of some sort. I once saw a young woman deliver a prize lecture for a national astronomy award. In her first sentence, she declared that the judges had made a big mistake in choosing her for the award. Although I think this was intended partly as a joke, it also showed her recognition that research results come from the combined work of many minds and fingers. As women, we tend to see scientific endeavor as a web of activity, and to work in groups to accomplish a common goal. It is somewhat foreign for us to think about distinguishing ourselves—moving ourselves up through a ranking or pecking order. Do give credit to your collaborators, but do not do it at your own expense. This is *your* chance to shine.

Be confident

The confidence with which you present your material is very important to your success in communicating your ideas. Although it is somewhat taboo for women to assert or assume they know everything, it is a sign of weakness for men to question their own abilities. If a woman shows through her words and manner that even she does not believe in her own abilities, then a man will find it quite reasonable that he should not believe in them either. Listen to yourself when you practice the talk, and make sure you sound confident. Then carry that confidence with you into the question-and-answer period.

For the beginning speaker, the prospect of a question can be daunting. No one, even the most expert researcher in your particular area, will know the answer to every question. What is important in the question session is to make sure you understand the question—sometimes by repeating it, to think about what you know about the answer, and to answer it as fully and correctly as you can.

I have been asked what the size scale of an image that I am presenting is, or how long it takes for a dwarf galaxy to orbit around the Milky Way, or what a quasar consists of, and I have answered, "I don't know." Big mistake. While it is okay to say "I don't know" in an offhand way that communicates "It is not important" when asked a detailed question about a fine point you have not thought about, everyone will learn more if you tell the audience what you do know about the question. The person who asked what the scale of my image was did not care whether it was 5 arcminutes or 10 arcminutes, but would have been happy to know that it was at

least not arcseconds or degrees. I did know that it was a piece of a 13-arcminute image, but I did not know how big the piece was, so I simply said, "I don't know."

In that same lecture, a physicist asked me what a quasar was. Now, of course, I knew that most astronomers think a quasar is a black hole with matter falling into it from an accretion disk, and that for some reason it is ejecting charged particles along its magnetic poles. But I haven't critically reviewed the literature, and I do not understand the physics of how gravitational potential energy from matter falling into the black hole from the accretion disk is channeled into charged particles spewing out of magnetic poles. So my first reaction was to say, "I don't know." I then realized that was the wrong answer, and communicated my description of a quasar while waving my hands around and saying it was a hand-waving answer. The audience learned more about my incredible ability to lose confidence in myself than about the physics of quasars.

Whatever the question, it can be answered with respect and dignity, to the fullest extent you know the answer, and without apology for those parts you do not know or techniques you have not tried. If a question is very detailed or in your opinion is not of general interest to the audience, you can offer to answer a complex question in person after your talk. However, do not overuse this response because it could be interpreted as "I don't know."

Try your best, and do not worry if you do not get everything exactly correct. It is an advantage of your colleagues that they do not remember ever having been wrong. I learned a lot about the male mind one day from my husband, who is also a scientist. He was pouring water from a plastic bottle into a glass, and when setting down the bottle, he managed to knock both the glass and the bottle off the kitchen table. He caught the glass before it fell, but the bottle and its contents spilled out onto the floor. He turned to look at me and said, "Hmm, it's a good thing I noticed that the bottle was plastic and saved the glass instead, or we would have had broken glass on the floor." No time lost there on regrets.

And keep smiling. After all, your subject really is interesting, and fun.

The author acknowledges helpful comments on this essay from Tim Beers, Katie Freese, Ingrid Wilke, three anonymous women physicists, and in particular Tim McKay. ■