How ***Not*** To Give a Scientific Talk

by Michael De Robertis

The importance of communicating well is often underplayed in science in general and in astronomy in particular. Yet the need to communicate clearly and concisely in science is at least as acute as in the humanities and social sciences.

We have all experienced scientific talks that have been both stimulating and memorable. Unfortunately, most talks - talks at all levels ï¿½ are by no means in this category!

What are the secrets of giving a good oral presentation, of giving a memorable talk? The answer to this question is beyond the scope of this article. To be truthful, I don't know the answer. But having attended hundreds of oral presentations over the past twenty years, I think I have some appreciation of the characteristics that lead to a *poor* scientific oral presentation, characteristics that I share below. The following provides an enumeration of *how not to give a scientific talk*. These are largely based on an excellent article by J.C. Garland (*Physics Today*, **44**, p. 42) and are supplemented by my own observations that reflect my particular biases.

Violate the three cardinal rules

To violate any of the three cardinal rules of giving a good scientific talk is to court disaster and to risk being consigned to immediate oblivion by your audience! But if ignominy is your goal, then I recommend that you:

1. Exceed the allotted time
2. Never practise beforehand
3. Never be prepared for a total failure of modern technology

Just as successful or memorable oral scientific presentations *are* practised beforehand, disastrous talks *are almost never* practised prior to their delivery. This is surely the strongest correlation of all. The reason that the quality of oral presentations (inevitably in English) at international meetings is higher by Europeans than by North Americans in my view is evidence that practising one's talk is the surest way of enhancing its quality and ensuring its successful reception.

If a talk has never been practised, the odds of exceeding one's allotted time increase dramatically, and nothing annoys an audience more than a speaker who goes overtime. This is the one "capital crime" of scientific presentations. Neophytes to the subject and experts alike ignore almost everything presented during "overtime," and the longer one proceeds, the more ill will one generates.

The third point may not be as common as the first two, but there are rare occasions when speakers are only prepared to deliver a talk in one format; e.g., PowerPoint, and are totally incapacitated when there is a failure of modern technology, e.g., the projector isn't delivered on time, or your laptop isn't quite compatible with the projector, or...

Put another way, if you forget that *an oral presentation is really a reflection of you,* then you are almost certainly doomed to give an inferior talk.

While the above may constitute "mortal sins" in the arena of scientific oral presentations, there are many more "venial sins" that are committed by presenters, flaws that detract from the overall quality of the presentation. I've loosely arranged these "sins" into a few categories. The order in each category is unimportant.

Deportment

1. Wear clothing that distracts from your science
2. Wear clothing that doesn't permit easily attaching a portable microphone

Neither women nor men should wear anything that could distract audience members from your principal goal of effectively communicating your science. This includes wearing revealing clothing, or dressing too formally or too informally for the situation. Women and men should also take care to wear clothing to which a portable microphone can be easily attached. At large meetings, the chair of the session sometimes (helpfully) tries to attach the microphone to the speaker's clothing. If you are uncomfortable with this protocol for any reason, simply make it apparent that you will attach the microphone yourself when it comes your turn.

Mannerisms

1. Continuously wander around the room
2. Jingle change in your pocket
3. Overdo the use of hand gestures
4. Act nervous and confused; ramble incoherently
5. Avoid making eye contact with the audience
6. Overdo the use of humour
7. Face the screen, often blocking the view of the projector
8. Speak in a muffled fashion with an irregular cadence
9. Raise the pitch of your voice at the end of sentences
10. Place a clip-on microphone on the wrong side of your shirt/top
11. Continuously wave your laser pointer on the screen making the audience nauseous

Few things are more annoying than when speakers display nervous mannerisms that distract some audience members from concentrating on the science at hand. For example, it is imprudent to wander randomly about the speaking area, of using exaggerated gestures, of using jokes or humour unsuccessfully, of failing to make eye contact with (at least certain members of) the audience, of speaking incoherently, of reading from the screen and turning your back on the audience for extended periods, etc.

While it is not inappropriate in the context of a scientific oral presentation to prepare some notes from which to speak, it is inappropriate to read the talk verbatim, either from the notes or the screen. And please ensure that the microphone is clipped on the side of your shirt/top that will be closest to the screen so that your voice doesn't fade out when drawing attention to something on the screen. Take care not to present in too bold a fashion - science doesn't admit absolute certainty - or too tentative a manner. With regard to the latter point, I've noticed that some inexperienced speakers sometimes raise the pitch of their voices at the end of some sentences thereby unintentionally reducing their effectiveness with the audience.

Level of Talk

1. Make the talk either too technical or too simple
2. Use equations profusely and gratuitously

It is essential that one accurately gauge the nature and level of the audience beforehand and tailor one's presentation appropriately. For an audience with mixed familiarity with your subject, one might devote most of the talk to an introduction to your subject and of a careful articulation of your incremental contribution(s). Use the last 10-20 percent of the time to speak to the experts in the audience, but ensure that the conclusion or summary is delivered at the introductory level. In this way, your presentation may indeed be memorable! It goes without saying that gratuitous displays of math or highly technical information are normally off-putting and should be avoided.

Written Material

1. Don't include a clear and concise summary slide of results
2. Don't leave the audience with a clear understanding of your most memorable finding
3. Ensure transparencies are illegible, densely packed, monochromatic, or a rainbow of colours
4. Use too many irrelevant animations in PowerPoint presentations, or colour schemes that render text illegible
5. Use modern technology to add "sizzle" rather than "steak"
6. On average, use more than one transparency or slide every two minutes
7. Adopt the "strip-tease" approach to showing transparencies

For very short contributed presentations (10-15 minutes), it is often most effective if one shows a clear and concise summary of your results both at the outset and conclusion of your talk. Use the remaining time to essentially fill in the details. Even for longer talks (30-60 minutes), it is a good idea to leave the audience with a clear impression of what you have accomplished. Nothing is more satisfying than to have explained a difficult concept to the audience in a way that they will recall for some time.

There are obvious pitfalls for speakers who employ high tech means of delivering an oral presentation. Just because technology routinely permits the introduction of animations, multi-coloured text, etc., that doesn't mean you should automatically employ these techniques *unless they illustrate in a clearer way an important concept*. In other words, unless you can add "steak" to the presentation by adopting high-tech methods, avoid them. Don't settle for just "sizzle."

In science, clarity and depth of understanding are paramount. The slide or overhead acts as a mere vehicle for the speaker to convey a profound point, or a new or different way of looking at a problem. It may therefore be counterproductive to show too much information or to show it in a halting way. Common sense should prevail, but "less" is better than "more" in oral presentations.

Answering Questions

1. Always argue with a questioner; provoke a fight
2. Always interrupt a questioner before he/she has finished asking the question
3. Drag your answer out for as long as possible to show off
4. Fake it if you don't know the answer
5. Don't give credit to anyone else's work and don't admit the questioner may be raising an important issue

The answer period constitutes an important component of a scientific oral presentation. Science works ultimately by challenging prevailing ideas, even your ideas! Coming at the end of a presentation, the question period will unavoidably colour how most audience members remember you and your science. It is therefore important that you adhere to a code of common sense and basic civility. By all means, enthusiastically recapitulate, expound and defend your science, but at the same time, be courteous, brief, admit unfamiliarity or ignorance of some point(s), and offer to discuss more esoteric or deeper issues "offline."

In summary, I have tried to enumerate various pitfalls that scientific speakers encounter when giving an oral presentation. I think it is important that effective communication skills form an integral part of undergraduate and graduate training. In lieu of a formal course in these techniques, perhaps lists such as this one, in conjunction with frequent opportunities to practice (e.g., journal clubs, senior seminars, etc.), could be used. This list is by no means complete and I welcome additions/comments from colleagues (mmdr@yorku.ca).

Michael De Robertis is Professor of Astronomy at York University. His main areas of interest are Active galactic nuclei, Galaxy formation, and Galactic structure. He is also deeply concerned about the popular portrayal and understanding of science. He welcomes comments and suggestions and can be contacted at: mmdr@yorku.ca