Professional Scientific Presentations

Use of Notes and Outlines
A professional oral presentation, because it is a form of publication, must be as meticulously planned and delivered as are printed publications like articles and books. Structurally, presentations by researchers most often follow the IMRAD format—Introduction, Materials/Methods, Results, and Discussion—or some variant of that basic model. Keep in mind, however, that you are speaking to an audience and not simply reading a paper. As Nobel laureate physiologist Peter Medawar (1979) has said: Under no circumstances whatsoever should a paper be read from a script. It is hard to overestimate the dismay and resentment of an audience that has to put up with a paper read hurriedly in an even monotone. Speak from notes, young scientist; to speak without is a form of showing off and only creates the impression (perhaps well-founded) that the same story has been told over and over again.

Notes should be kept brief and not consist of long paragraphs that must be waded through. A useful strategy is to first write out your presentation in full, and then make an outline that will facilitate your checking for various features, including the following:

- Opening statement. Your beginning can be constructed to help capture the attention of your audience (see examples in the next section).
- Purpose and objectives. These must be clearly and emphatically delineated.
- Methods, materials, and findings. Present these in a simple, clear, straightforward manner. In your notes, methodological details will need to be streamlined or sketched.
- Visuals. Make visuals easy to follow and plan exactly what to say about each one.
- Discussion and conclusions. Connect these directly and clearly to your findings and to the purpose of the study.
- Overall coherence. Check for clarity and effectiveness of wording and visuals; smooth transitions between sentences, paragraphs, and sections; and logical placement of all content.

As a general rule of thumb, you should allot 10 percent of your outline to your introduction, 80 percent to the middle sections (methods/materials, results, and discussion), and 10 percent to conclusions. Most of these components will differ from those of a printed article primarily in simplicity, conciseness, degree of detail (they will be streamlined where possible), and coherence techniques.

Introduction and Opening Statement
It is worth devoting sufficient time to the beginning of your presentation since it is likely to influence your listeners' response to the remainder of the presentation. You can create a positive impression from the start with a polite greeting and an expression of appreciation for the opportunity to address your particular listeners. While the most obvious and common opening for a presentation is a statement of topic and purpose, this approach rests on risky assumptions: that your listeners have a consuming interest in the topic, that they have heard and understood the title of the talk and studied a previously published abstract, and that they continued on page 30
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have a thorough knowledge of work on the topic to date. Since these assumptions may be far from true, it is worth delaying your statement of topic and purpose statement for a moment in favor of capturing attention with an opening like one of the following:

- Quote from another researcher's work that sets the context of your own topic or problem. ("Barry Commoner, in pointing out the immense difficulty of measuring the Greenhouse Effect, once said that.")

- Make a startling statement to jolt your audience into attentiveness. ("Cell membranes seem to be wide open to penetration by all sorts of noxious substances— that is, if you consider them merely as physicochemical barriers.")

- Use a negative statement to heighten suspense and anticipation. ("Lowering blood cholesterol will not prevent atherosclerosis. At least, there has been no good evidence for this so far.")

- Offer a striking comparison/contrast to provoke immediate, critical thought on your subject. ("Few phenomena are so well understood thermodynamically, or so ill understood kinetically, as the osmotic flow of a solvent through a semipermeable membrane.")

- Use the audience's dominant interest to establish a rapport. ("We are all familiar with the thesis that bats use radar to navigate in the dark. I would like today to offer a novel explanation of this capability.")

- List specific instances that relate to a general topic. ("Molecules can pass through a membrane by passive diffusion, or by dissolving in the membrane lipids, or by active transport. Which of these applies to the absorption of bile salts in humans?")

- Pose a rhetorical question to focus attention on the purpose of your study and to prompt the audience to think about the main issue. ("How much do we really know of the long-term environmental impact of landfills?") Lannon (2002) provides an excellent student example of a detailed sentence outline for a presentation titled "Pollution Threats to Local Groundwater" that includes this simple and effective opening statement: "Do you know what you are drinking when you turn on the tap and fill a glass?" (The sections of the presentation cover aquifers; hazards from sewage, landfills, and saltwater intrusion; and long-term environmental and economic consequences.)

Beside openings of these kinds, you can use a device such as a broad statement that gradually narrows, leading to the purpose of the study being reported: a descriptive opening (well suited to papers dealing with new equipment and new techniques, for instance); or a historical approach.

Following your engaging opening, delineate your subject and purpose in a way that orients your talk around one central idea, distinguishing carefully between big points and little ones. Your listeners are not likely to do this on their own. This strategy should be pursued throughout the remainder of your talk, so that your audience is not left confused, disoriented, and anxious to exit.

Presentation Body, Visuals, and Conclusions

Here I offer a few brief considerations about middle sections, visuals, and closings. It hardly needs emphasizing that in the body of a presentation one's methodology and findings must be presented coherently, in a logical and easy-to-follow order, and as unambiguously as humanly possible. An additional element is the design and incorporation of visuals. Finally, the concluding section must in key respects receive particularly close attention and provide a final opportunity to emphasize the significance and implications of the research and the results obtained.

Following Davis's Scientific Papers and Presentations (1997), I offer few general points to consider as you present your methodology and results:

- Keep in mind that most of your audience will know less than you do about your subject. Do not gear the talk toward those few who may know more than you and thereby risk losing the majority of your listeners.

- Avoid the use of statistical and technical jargon whenever possible, even when addressing your own peers, but do indicate what statistical analyses have been applied to your data.

- Focus more on the fundamental scientific or technical concepts than on the statistical techniques.

- Include specific examples to reinforce your main points.

- Number items as you talk to help your listeners follow when one point or problem ends and another begins.

- Cite authorities or provide sources for your information, especially if there are people in your audience who may have contributed information used in your presentation.

- Consider yourself and the content of your talk to be the central focus of your presentation, not your visuals or slides (often electronic these days). Graphics are merely visual aids for enhancing your presentation, and used ineffectively, they can undermine your talk. In short, they are no substitute for adequate preparation and effective oral exposition.

With respect to the mode or vehicle of the presentation itself, including use of visuals, the most significant development over the past decade is the use of computers and presentation software both to outline content and to create visuals. An example of software widely used for multimedia presentations (outlining, still and moving graphics, video, sound effects) is Microsoft PowerPoint, which could easily be the subject of a column by itself. Riordan and Pauley (2002) offer some points to keep in mind when preparing your visuals, especially (though not only) with electronic presentations:

- Use only one font, such as a sans serif like Helvetica or Arial.

- Restrict use of different sizes, boldface, or italics to prevent distractions.

- Avoid using an excessive number of outline slides (e.g., with Power point) or data visuals, so that you may show each one long enough for your audience to absorb its contents and significance. There is no magic number of seconds or minutes, since visuals vary in complexity, and rehearsing will reveal when timing or cognitive problems may arise and in what aspects revision may be needed.

- Provide numbers and titles for all visuals, and label axes on graphs. Use larger (18- to 24-point) fonts for titles.

- Keep slides simple and uncluttered. A slide or graphic containing a limited amount of information—one or two formulas or curves—is far more effective than a cluttered one.

- Graphical and typographical elements should be designed for easy perusal.

- Restrict the number of lines and columns (to no more than seven or eight of each).

- Use colors if helpful, but not just for aesthetic effect. When using different colors, be aware of how well they go together, and of the fact that colors used in an article will probably not work as well on a screen. Effective schemes are yellow backgrounds with black lettering or deep-blue backgrounds with yellow lettering. Also, keep in mind that about 10 percent of people suffer from color blindness, so use greens and reds sparingly.

A couple of final points to consider, which I will mention only briefly here, are how you make transitions between electronic slides, and the uses of animation and sound effects.
Any of the techniques you use can be either helpful or distracting. Transitions that "wipe up" will help guide your audience to the top of the slide so that the subject of the frame can be identified right away. Or, between sections of a presentation, a simple fade to black will signal that you are moving on to a new point. Once again, rehearsal is invaluable because it enables you to see what methods will work best. Knowing the composition, needs, and expectations of your audience will also be helpful with planning and incorporating transition, animation, and sound-effects features.

Rehearsing
Once your outline, notes, visuals, and slides (or frames) are prepared, rehearse your talk. Repeated practice will, as I have indicated earlier, help you to troubleshoot difficulties, hone the force and pitch of your voice, check your professional demeanor, ensure your timing, and boost your confidence. As with print publication, there is both an "art" and a "science" to the process of preparing oral presentations, in terms of how one presents information in a manner that is listener-friendly and comparable to reader-friendly writing. Researchers are tradition-bound and professionally obligated to serve their listeners well by making their presentations as engaging, easy to follow, informative, and technically accurate as possible.

The aspects of presentations covered here are not intended to be comprehensive. Nevertheless, mastering them will go a long way toward helping your research presentation become memorable for its overall professional competence and for the satisfaction it gives your audience.

References

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raising that awareness to higher levels. This guidebook is based on an actual undertaking that was used to accomplish these very goals.

We are well aware that many local environmental health programs struggle because they can’t generate the political support that would prompt local policy makers to commit the resources needed for environmental health activities. The purpose of this document is to give local programs like yours the tools you need to raise awareness of your efforts and, in so doing, gain heightened support for the services you are providing (or need to provide).

That we have made it to this point is tremendously exciting for us. Several years ago, while pouring through the market research that we conduct to keep our association aligned with the needs of this profession, we recognized how useful such a research program could be. From there, it was a matter of conceiving this new program. Then, of course, we had to make it operational with the appropriate staffing and budgetary support. The research projects I have just described needed to be organized and conducted. And now, we have real product to show for our efforts.

The intent of my column this month has been simply to share what is now available from the ARC. In addition, I have a twofold appeal to make.
First, if you have any specific ideas about research you think we should be conducting, please pass those suggestions along to us. In particular, I’d ask that you forward your ideas to Julie Muñoz, who manages the ARC. She can be reached at the Denver office.
Second, though we are making every effort to make this program an economically self-sustaining one, as with many of our programs, we would stand to benefit from sponsorship support. Accordingly, if you are in a position, on behalf of your company or organization, that enables you to provide some measure of support for this unique program, we would welcome a discussion. Please contact me directly if you, your company, or your organization would like to be involved as an ARC sponsor.

In the meantime, stay tuned as our new program now takes flight! We maintain high expectations for the ARC and its ability to help the profession as a whole as well as each of its practitioners.

Environmental Health Practice in the 21st Century

May 9, 2002
1:00 PM - 2:30 PM ET

A Public Health Training Network
Satellite Broadcast Program
Web site: <http://www.phppr.cdc.gov/phtn/>

Environmental health services and sanitation have been the backbone of public health in the United States for many decades. The emergence of many new issues and threats such as Cryptosporidium in drinking water, hantavirus, E. coli O157:H7, West Nile virus, and most recently, domestic terrorism point to a need for a well-prepared environmental health services (EHS) system and workforce that can anticipate, recognize, and respond to these types of threats. In recent years, the capabilities of the EHS system at state, tribal, territorial, and local levels have visibly decreased, which has led to systems that are not adequately prepared to address such threats. EHS experts will address the six goals CDC developed in collaboration with its many environmental health partners to revitalize the EHS system. The program will highlight the issues, challenges, and activities facing the EHS system in the 21st century. This broadcast will include presentations, discussion, and audience participation.

Continuing Education Credit
Information will be posted when available.

Satellite Technical Specifications
This broadcast will be available on C- and Ku-bands. To view specific coordinates call 888-232-3299 (or 877-232-1010). For the hearing impaired, please enter document #130023 when prompted.

Registration and Viewing Instructions
Visit <http://www.phppr.cdc.gov/phtnonline> to register online for this course. Site registration begins in March 2002. Individual registration begins in April 2002. For questions about registration, call 1-800-41-TRAIN.