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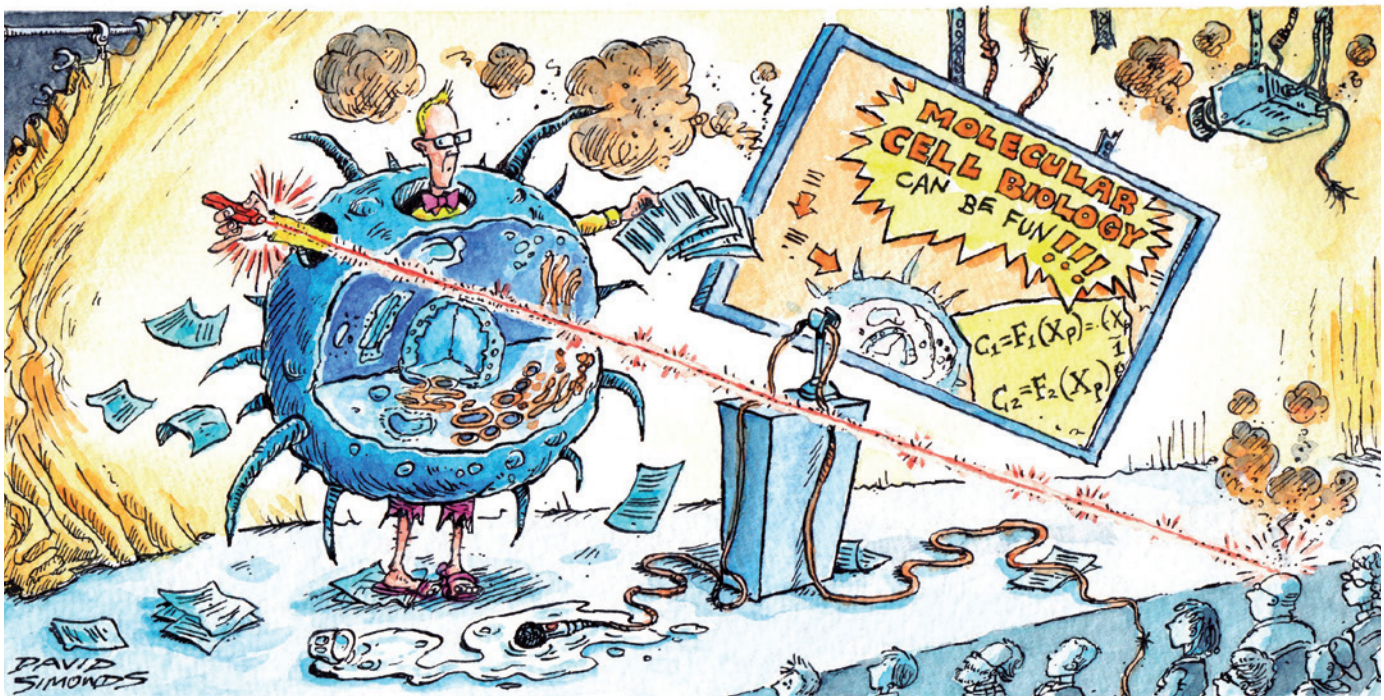

PRESENTATIONS

Pressure to perform

Talks offer scientists a chance to show off their work, but it is difficult to make an impact.

BY KAREN KAPLAN

It was 40 years ago, but thinking about one of his first talks to a large audience still makes Martin Raff shudder. Raff, a neurobiologist and now emeritus professor at the MRC Laboratory of Molecular Cell Biology at University College London, had been invited to present at a symposium on cell membranes. He had decided to rely on his slides for his 45-minute talk, forgoing notes or a crib sheet.

Raff walked onto the podium, faced the audience of several thousand people — and forgot everything he had planned to say. "As soon as I started, I hit a blank," he recalls. "I couldn't remember who I was talking to or why, or what my talk was about." But Raff didn't lose his cool: he asked the technician to put up the first slide, which helped him to regain his footing. "That gave me a clue, and I just ad-libbed to get myself into the introduction," says Raff. "I don't think the audience could tell what was going on, but there were some embarrassing silences in the first minute or two."

Many early-career scientists can relate to Raff's panic. Plenty can — and does — go wrong with presentations. But a researcher can deliver a memorable talk by following a few basic principles, rehearsing often in front of different listeners and making a back-up plan. To excel at touting their work, scientists should become as familiar with the podium and microphone as they are with the lab bench.

SETTING THE STAGE

Before putting a talk together, presenters need to determine their audience's level of expertise. Giving a talk is a balancing act: too technical, and some listeners get lost; too general, and they get bored. Talks of 30–45 minutes or longer tend to draw larger and more general audiences who need plenty of background and context. Shorter presentations are often for smaller groups that share the speaker's speciality, so these talks can be targeted, detailed and technical. One-size-fits-all presentations should be avoided, say veteran speakers. "If there's any doubt, if you have any questions about the level you should be pitching to, you should consult the scientific organizing committee of the conference," says Michael De Robertis, an astronomer at York University in Toronto, Canada. "That is critical. There are no excuses for getting it wrong."

For larger audiences and longer talks, veteran presenters suggest that the speaker start by piquing the audience's interest with a general but compelling question about the topic, followed by a discussion of why it is interesting, and a description of the presenter's research question or hypothesis. "If you're going to talk about cell-size control, you might say, 'Why is it that we as humans grow to be so much larger than a mouse?'" says Raff. Jim Hudspeth, a neuroscientist who studies the role of hair cells in hearing at the Rockefeller University in ▶

New York, might launch a general presentation by noting the links between deafness and issues such as delayed speech in children and susceptibility to depression in adults. Then he would describe what motivates him, such as the fact that 30 million people in the United States have functionally significant hearing problems, and explain his research question: he wants to examine how structures in the ear amplify sounds.

"It's almost like a playwright coming out and saying, 'Here's a distillation of the plot, and I'm going to introduce all my actors and tell you why,'" says Christopher Nicchitta, a cell biologist at Duke University in Durham, North Carolina. "You need to build up some tension and excitement about what's going to unfold."

The actual presentation of findings can be fairly straightforward for any audience. The speaker might say simply, 'Here's what we found', and illustrate the point with some attention-grabbing data. Hudspeth might announce, for example, that he has learned that bundles of the ear's hairs respond to mechanical stimulation by exerting forces that accentuate the stimuli.

But explaining those findings — why they are significant and what they mean for the field — takes a bit more effort when the audience is less expert. Trying to build interest in discoveries is pointless if listeners ultimately say, 'So what?'

"Say you found a star that is heavier than it's supposed to be. You'd go through the conventional science wisdom about the mass of stars, how they're formed and why they should be only within a certain mass range," says De Robertis. After explaining the measuring techniques used, the speaker would show how their findings defy the widely held view about a star's maximum mass. "Then you have to explain why that's important to a larger problem — what the broader implications are," says De Robertis, adding that he might say that the estimate of the star's mass challenges what astronomers have believed are the upper limits of mass set by outward radiation pressure.

Neither the talk's introduction, with its emphasis on context, significance and motivation, nor the explanation of implications and importance is necessary in a short, targeted talk for an audience of specialists. "You don't give the introduction — they're quite expert and they've read the abstract," says Hudspeth. "You simply say, 'Here's the scientific conundrum, here's how I'm addressing it and here's what I've found'."

POINT AND POWERPOINT

Slides can help researchers to explain their findings. But inexperienced presenters often run into trouble by overusing colour or animation, or by cramming in too much text or data. "Don't overwhelm the audience with details," cautions Doug Cyr, a cell biologist at the University of North Carolina at Chapel Hill. Complex equations and formulae should be avoided— even if they support the discovery, says De Robertis. "Show the punchline," he says. "Leave the rest of it to the publication." Too many slides may turn an audience off. "You're not giving a commercial for your data," says Leslie Kean, a paediatric blood-and-marrow-transplant physician at Emory University in Atlanta, Georgia (see 'Power pointers').

Slides can, however, provide effective transitions between subtopics — important in longer presentations. "If you're making three or four major points, the really critical times that you can risk losing your audience are at the seams between them," says Hudspeth. He might signal to his audience that he has finished talking about anatomy, for example, by briefly summarizing what he just said. Then he might announce that a physiological analysis is next, and show a slide with a key point or a diagram that sets up the next idea. "You have to help the audience shift gears," he says.

How can speakers tell whether they are reaching their listeners? Simple — audience members are smiling, nodding or both. By contrast, if they are tapping on phones, laptops or tablets, they are far away. If this happens, experienced presenters advise recalibrating the talk. If it seems too sophisticated, the speaker should skip some slides and change to less technical language. If the audience is more expert than anticipated, details can be added, especially if there is a whiteboard handy. Expert speakers also recommend establishing and keeping a connection by getting as physically close to the audience as possible. Hudspeth walks out from behind the lectern and comes down to the front row. Dan Agan, president of Panthera, a communications company in Alexandria, Virginia, suggests that speakers walk through the audience if they can. "You need to get closer to connect."

REACHING OUT

Presenters should also engage the audience by stimulating as many senses as possible — from sight to touch. Agan says that establishing a physical connection is key: "Do it in absentia — bring a prop, something you can pass around that's yours, and it creates the illusion of touch." Hudspeth uses a tuning fork and a 60-centimetre model of a hair bundle that shows audiences how hair cells in the ear move in response to sound waves and conduct signals to the brain. "They vary the tempo and break up the monotony of people sitting in the dark, staring at the screen," he says, "and they help make my point, especially to a general audience." If the crowd is too large to pass objects around easily, the speaker can use them as visual props and invite audience members to come up and handle them after the talk.

Speakers should also consider audience comfort: the temperature of the room; the availability of drinking water; how close together the chairs are; and the time of day. "If an audience is uncomfortable, I'll guarantee that any evaluation of my talk will go far, far down," says Agan, who adds that it is best

DOS AND DON'TS

Power pointers

- Aim to spend about one minute on each slide.
- Don't crowd in tonnes of text — it will distract the audience.
- Don't read the slide aloud — discuss a point or two.
- Use a blank, white background and an easy-to-read, unstylized typeface.
- Use animation only sparingly.
- Don't use lots of colour in your figures — it will distract from the data.
- Don't show your conclusion too early in the presentation — you will scoop yourself. K.K.

WHAT TO AVOID

Presentation peeves

- Don't go over your allotted speaking time. The audience will be annoyed and you will cut into question time.
- Don't wear ripped jeans or shorts and sandals, even if you are in a tropical climate and living on a graduate-student budget. But don't wear a three-piece suit either, unless you are presenting to potential investors. Aim for 'business casual'.
- Don't talk quickly to fit everything in.
- Don't get very technical, even for an expert audience. Not everyone will understand.
- Only glance at the screen and at your notes. Make as much eye contact with the audience as possible.
- Be very careful about making jokes. International audiences, especially, may not understand them, and everyone will remember the joke that fell flat.
- Don't swig continuously from a water bottle or jingle your change. It is distracting.
- Don't get defensive or raise your voice if an audience member challenges you. Stay calm and say that it is a good point, or invite them to chat after the session.
- Don't panic if you don't know the answer to a question. Reply that it is unknown, you are not sure or you had not thought of it. K.K.

to present first thing in the morning, or at least before lunch. If a speaker must present immediately after lunch, and has any say in what is served, Agan recommends a light meal. Heavy fare will put an audience to sleep, he warns.

Inexperienced presenters can risk losing their audience because of unpolished technique (see 'Presentation peeves'). Rehearsing often in front of as many different groups as possible — lab mates, other postdocs or students, mentors, advisers — can mitigate the problem. Ideally, rehearsals should be filmed so that speakers can see themselves, and listeners need to be frank about recurring glitches such as repeated use of 'you know', talking fast, blinking frequently, looking down or frowning. "Ask them to be hard on you," says Nicchitta. "The more you're aware of what you're doing, the easier it is to control it so that it doesn't become a distraction."

Panic can trigger nervous mannerisms, but speakers can stave it off with a back-up plan or two. Divya Koura, a specialist in internal medicine who is doing a fellowship in oncology and haematology at Emory, gave one of her first talks in December, to a medical society. She gained confidence not only through practising for weeks in front of different groups, but also by creating a brief script. "By the end of all my rehearsals, I knew I didn't need it — it was just there," she says. "But at least I knew I was saying everything I had wanted to. There was less stumbling and no 'ums' or blank spaces."

Many speakers recommend using the 'Presenter View' feature of PowerPoint, or presenter notes in Keynote, to provide digital crib notes — safer in some cases than paper. Agan remembers watching a speaker drop a sheaf of notes in the middle of his talk. "By the time he had retrieved everything, he was so desperate and so flummoxed that his presentation turned into an indecipherable and impenetrable disaster," recalls Agan.

Seasoned presenters warn against writing out the entire talk, no matter how short — or long. It is all too easy to start reading from notes. The audience will know that they are being read to, and will drift — or, worse, leave. It is much better to create a brief outline with key points, and to rehearse the talk incessantly. Relying solely on slides can be dicey, as Raff's experience shows.

But even the best talk can suffer if the speaker doesn't use the simplest, most effective tool for establishing rapport with the audience. "The human face has 250,000 different expressions, and one stands head and shoulders above all else in terms of influencing an audience," says Agan. "And that is a smile." ■

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COLUMN

Ticket to everywhere

The fossilization of the PhD harms students, employers and science in general, argues **Peter Fiske**.

-ALBACHIARAA-/SHUTTERSTOCK

Many career paths are undergoing a startling transformation. Instead of locking themselves into one discipline for an entire career, professionals now switch jobs often and jump disciplines and industries routinely. Such dynamism increases productivity, creativity and entrepreneurship; interdisciplinary mobility promotes exchange of ideas and business models.

And yet the training of scientific professionals through the PhD has remained essentially unchanged since the nineteenth century. Promising students are apprenticed in academic laboratories. They learn how to conduct research, but are not prepared for success outside academia. Despite decades of policy papers, earnest admonitions and hand-wringing in the United States and Europe, actual reforms have been marginal.

The 'fossilization' of science PhD training is detrimental to young researchers — and to science as a whole. Poorly equipped to compete for jobs outside academia, many PhD holders leave university lacking confidence in their prospects. Some feel that they have bought a ticket to nowhere.

Academia might do well to look to the private sector for a model that broadens the soft skills of PhD holders and expands their prospects. Many businesses offer their executives short, intensive training programmes that stimulate their professional development in key areas such as leadership, innovation and management. Some companies develop internal schemes; others hire consultants or send their executives on week-long programmes at business schools (sometimes referred to as 'charm schools'). The goal is simple: to develop the capabilities of junior managers without costing a lot in terms of time, money or disruption to their jobs. These programmes also reflect an acknowledgement that a supervisor should not be the sole source of professional advice and mentoring.

Some research universities in the United States and Europe provide professional-development offerings for graduate students, often led by a campus career centre — a few of which have specialists dedicated to PhD students. But support is meagre: a university may have only one person to support professional development for hundreds or even thousands of PhD students. Science departments (and funding agencies) rarely provide financial support for such activities.

Where such programmes exist at all, they are more tolerated than encouraged by the faculty. Academic culture enshrines the adviser–advisee relationship as the core of the PhD. But although the adviser is ideally suited to guiding students through the rigorous training necessary to become an independent researcher, he or she may be ill-equipped to help them to develop the skills to succeed in other fields. Not only do few faculty members have experience in industry, but most already have enormous demands on their time. Urging them to provide all manner of professional development is unfair to both adviser and advisee.

Formal professional-development programmes for science PhD holders should be expanded. But how to finance them? Those who benefit should pay. That includes not only funding agencies, but also students. They might pay through general student fees. Even better — to ensure that they are fully invested — they might devote credits to an actual course on career planning (see *Nature* **489,** 593; 2012).

The students themselves will benefit from realizing broader career options. Universities benefit both through greater demand for their graduates and by ending up with more-satisfied (and better-paid) alumni.

But the largest benefit may be to national economies, when scientifically educated individuals enter every professional discipline — no longer because they couldn't find a job in academia, but because they chose to apply their training to important problems in a wide range of fields. With the combination of the right professional coaching and the right experience, a science PhD could turn out to be a ticket to everywhere. ■

Peter Fiske *is chief executive of PAX Water Technologies in Richmond, California, and author of* Put Your Science to Work *(American Geophysical Union, 2001).*