

CAREERS

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OUTREACH

Speak up for science

Whether publishing contentious findings or defending evidence, the right tone is essential.

BY VIRGINIA GEWIN

David Robert Grimes, a postdoctoral researcher at the University of Oxford, UK, is an adamant defender of science, but the blog post he wrote in August caused quite a stir, even for him. Troubled by an upcoming vote by Dublin City Council on whether to stop fluoridating the city's water supply, in his post he implored councillors to heed evidence that fluoridated water helps to prevent and slow tooth decay. His contention that claims to the contrary are inflammatory, invalid and dishonest prompted critics around the world to call for his resignation, he says.

Grimes's experience may be extreme, but it serves as a reminder that publicly presenting controversial findings or opinions — even

if they are factually sound — can leave one open to hostility. When it comes to speaking up, the uncomfortable reality is that sometimes scientists, especially those at trainee and junior levels, face a difficult choice: courting controversy can exact a career toll, but staying mute can lead to harmful policy decisions uninformed by science.

Early-career researchers who want to speak out must learn how best to communicate science and how to respond productively to criticism, experts say. Yet many young researchers engage the public armed with little communications or media training (see *Nature* **468**, 465–467; 2010), and when wading into combustible topics such as climate change, evolution and public health, they quickly learn that science often runs counter to strongly

held ideology. Industrial factions with vested interests may mount a campaign to debunk the science — and sometimes even scientific colleagues can come out swinging if they hold opposing views or feel that an outspoken colleague is crassly seeking the spotlight.

Grimes knows all about the negative consequences of putting one's head above the parapet. He has written evidence-backed opinion articles on provocative topics such as climate change and abortion rights, and in return he has received angry e-mails and several threats of bodily harm. On a couple of occasions, he had to take out a restraining order against harassers. For his efforts in standing up for science, in October 2014 he was one of two recipients of the John Maddox Prize, an initiative of *Nature*, the philanthropic Kohn ▶

► Foundation and the UK-based charity Sense about Science that recognizes efforts to promote evidence on matters of public interest.

Most researchers will not be as willing as Grimes to put themselves in the firing line, but at some point many scientists will have to present findings that are deemed controversial, or they might feel the need to stand up for the evidence, as Grimes did. At this point they need an adviser who can provide support when they engage with the media — and there are also several approaches that can be used to head off hostility before it has time to gain strength.

HEIGHT OF CONDESCENSION

When Grimes first began to write opinion pieces three years ago, he admits that he was slightly naive. “I thought the public suffered from an information deficit and all I needed to do was simply inform them what the science says on matters of policy,” he says. He quickly learned that expecting people to make decisions based solely on evidence is presumptuous at best. Worse, scientists who take that approach

“There is blood, sweat and tears, but ultimately we reward people that make science stronger.”

may sound condescending. “Scientists have a highly technical voice that can come across as talking down to the audience, even if they don’t mean to,” says Kathleen Hall Jamieson, director of the Annenberg Public Policy Center at the University of Pennsylvania in Philadelphia. Likewise, if scientists seem self-interested or partisan, they risk undermining their credibility.

Jamieson decided to test whether scientists could improve the acceptance of their message. In September 2014, she published a model science-communication strategy¹ that she tested using the particularly divisive topic of Arctic sea-ice trends. The model assumes that showing respect for an audience — such as avoiding technical language or jargon that could be perceived as ‘talking down’ — is key to making a strong case for the science. She found that researchers can boost acceptance of their message when they rely on highly regarded, apolitical sources of information and visually present statistics that invite the audience to draw their own conclusions (see ‘Tough sell’).

Boris Worm, a marine ecologist at Dalhousie University in Halifax, Canada, agrees that evidence is key to maintaining one’s voice even when under attack. In 2006, he published a controversial paper² that suggested that declines in global fisheries were impairing the ocean’s ability to provide food and maintain water quality. Established fisheries biologists began to criticize his work.

He remained impassive. “When paradigms are challenged, it can get really heated emotionally, but while it can come across as a personal attack, it’s not,” he says. “It’s about the results.” If anything, severe scrutiny can be seen as a sign

that the pursuit really matters, he argues.

But Worm adds that it is crucial to embrace criticism if it is valid and not simply mud-slinging. “Don’t try to run from the criticism; instead, directly engage it,” he says. In his case, that meant writing a paper with his critics³. He is as proud of that paper as he is of the initial work. “There is blood, sweat and tears, but ultimately we reward people that make science stronger and better and give them our respect,” he says.

Nancy Baron is director of science outreach at COMPASS, an organization based in Portland, Oregon, that provides media training to scientists. She advises her clients to consider sharing bits of pending publications with known critics to get their reactions beforehand — that way they can prepare for potentially acerbic push back, or possibly circumvent it. “This acknowledgement is often seen as a sign of respect, which can take some vehemence away and lead to a much more cordial discussion,” she says.

EMBRACE THE CRITICS

Evolutionary biologist Kevin Laland at the University of St Andrews, UK, took this tack. He had grown weary of fending off sceptics who, he felt, were misrepresenting his theory on how organisms can change their environment to produce evolutionary and ecological consequences. So he invited them to co-write a paper with him. After 26 rounds of editing, they produced an article that laid out the nature of the dispute, including where the two camps agreed and where they did not⁴. “I think this approach is far more helpful than attacking one another and throwing smoke,” he says.

In retrospect, Martin Krkosek, now a population ecologist at the University of Toronto in Canada, wishes that he had taken a similar approach and had let colleagues know of his provocative findings as a doctoral student in 2005. Instead, he floundered on the release of a paper⁵ that linked aquaculture operations to sea-lice infections in wild salmon. Colleagues in his field found themselves in the middle

of a media storm that they had no idea was brewing. “I worry, now, that when I put out a grant proposal it lands on the desk of someone whom I made life hard for,” he says. “Letting them know this paper was coming would have been a nice olive branch.”

The experience was a learning process for him, and he came to realize that it is important to address all manner of negative feedback. When the paper came out, he and his co-authors chose to respond only to criticisms raised formally in the scientific literature, not in the popular media. “We just didn’t respond to all the stuff that came out in the press — and we realized that our lack of follow-up may have diminished the work’s impact,” he says, because for one thing, it was easier for industry voices in the press to question whether aquaculture was truly to blame.

When it came to releasing two follow-up papers, Krkosek and his co-authors were better prepared. “The first thing we did was create time to deal with it,” he says of the media onslaught. They engaged in lengthy e-mail correspondences with critics, responded to media requests for interviews and developed a web page where they could post answers to frequently asked questions. The website, he says, was helpful because it gave them a venue to explain results in more detail and to supplement their findings with new analyses.

Ultimately, the evidence in the three papers, corroborated and further explained in press interviews, on the web page and in individual correspondence, helped to compel changes in management and policies by the British Columbia government that benefited wild salmon: changes that included a moratorium on further aquaculture development.

“I had a great sense of satisfaction that we had a real impact on the ground,” says Krkosek. And that is what Baron counsels young scientists to do — to take the long view. “Dealing with backlash is no fun, but in the end the result is often worth it,” she says. And there can be

TOUGH SELL

How to speak out on controversial topics

If you want to get your message across, it pays to know the most effective ways to engage. Here are a few tips from researchers, including communication expert Kathleen Hall Jamieson of the University of Pennsylvania in Philadelphia.

- Leverage your scientific persona. Viewers and listeners will believe that a scientific source is credible if they also believe that the scientist is respectful and is not trying to ‘sell’ or persuade them.
- Walk the audience through the logic behind your conclusions.
- Show the audience the clear and

irrefutable data trends. Include all data — omissions allow critics to call your motives into question.

- Translate the science into familiar concepts for all audiences.
- Anticipate tough questions and be prepared with answers.
- Set aside time to respond to media and critics.
- Create a website with frequently asked questions and responses.
- Embrace valid criticism and respond to it unemotionally.
- Consider reaching out to the opposition. **V.G.**



Meteorologist J. Marshall Shepherd, host of *Weather Geeks*, is comfortable advocating for science.

unforeseen benefits: Krkosek says that he has become more adept at separating his emotional and intellectual responses — a skill that has been useful in both his career and his personal life.

Kathie Dello, associate director of the Oregon Climate Change Research Institute in Corvallis, has also learned how to deal with criticism. She gives public talks that highlight the regional impacts of climate change, and she has had some harrowing in-person and e-mail encounters with the public and researchers, in which her understanding of the science behind her assertions has been questioned. After a negative encounter, she allows herself only a short amount of time to process it and to salvage any lessons from the experience. (She has learned, for example, to request a moderator at public forums.) Then she moves on. She has also learned that a game of dodgeball can be cathartic.

VALUED OPINIONS

There is little doubt that the greater a scientist's standing, the greater the impact their words will have — and, conversely, the lower a scientist's standing, the more potentially devastating any fallout from their words will be for their career. Perhaps not surprisingly, many scientists wait until they are in senior positions to use their voices.

J. Marshall Shepherd, a meteorologist at the University of Georgia in Athens, had published dozens of papers and had received a presidential award of excellence, but becoming president of the American Meteorological Society gave him a platform to amplify his voice. He now writes opinion pieces, is active on social media and hosts a television show called *Weather Geeks*. He advises younger scientists to do two things when deciding whether to speak up for science — establish

scientific credibility and carefully evaluate whether they have the unshakable temperament that is necessary for times when they may be challenged.

Wildlife biologist Chris Darimont at the University of Victoria in Canada frequently speaks out on trophy hunting and other controversial issues that he has studied, and has engaged in live radio and television debates with trophy-hunting advocates. But before he secured his tenure-track position, he worried about the backlash he could receive for such public speaking, and the long fingerprints it would leave on the web. “When people are assessing you for a job, it's not just your CV they are reviewing, it's any controversy online as well,” he says. He eventually concluded that efforts to engage constructively in the public sphere could shine through, too. “I accepted that I would take the good with the bad,” he says. He also finds it productive to engage with policy-makers. “Thinking some decision makers are going to find your paper in a journal, understand it and use it to make evidence-based decisions borders on absurd,” he says.

Ultimately, scientists who speak out create room at the table for evidence, say those who have found their voice. “If we aren't there speaking on the science,” says Shepherd, “people skilled in messaging, such as attorneys and lawyers, will fill the gaps.” ■

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CAREER DECISIONS

Of academic interest

A survey of 1,500 recent US biomedical PhD graduates found that white and Asian men, who are well represented in academic institutions, are most likely to show interest in becoming academic researchers (K. D. Gibbs *et al. PLoS ONE* **9**, e114736; 2014). Although scientists of all ethnicities reported losing interest in faculty careers as their doctoral studies continued, women's loss of interest was more pronounced, particularly for underrepresented minorities. The trend persisted after controlling for factors such as publication record and a sense of belonging. Understanding why career interests differ is crucial for increasing diversity, says study co-author Kimberly Griffin of the University of Maryland, College Park.

GRANTS

Paint me a picture

Applicants for US National Institutes of Health (NIH) grants will now be asked to contextualize past work, which could help early-career researchers. A revised ‘biosketch’ section instructs scientists to explain how their experience will allow them to accomplish the proposal's goals. Sally Rockey, the NIH's deputy director for extramural research, has said that the change puts focus on an applicant's skills and accomplishments, not just their publications. The format is being rolled out in January and will become mandatory for most NIH grants on 25 May. Online tools such as SciENcv have been updated to help applicants to create biosketches that can be used across various government agencies.

HIGHER EDUCATION

UK science numbers up

Between 2003 and 2012, UK student enrolment in the biological and physical sciences rose by more than 30% and overall university enrolment rose by more than 6%, according to a report by the country's Higher Education Statistics Agency. But across all fields, the number of postgraduate researchers increased by only 0.1% for 2012–13, the smallest increase since 2004. In the decade since 2003, enrolment at UK institutions fell sharply for students from the Middle East (–124%), Asia (–63%), Africa (–36%) and North America (–31%), but rose for students from Australasia (22%) and South America (21%).