Communicating Science with Integrity, Effectiveness, Humor, and More: Some Highlights of the 2016 AAAS Annual Meeting

Christina B Sumners, Abdulaziz Tijjani Bako, Omar Fabian, Iveliz Martel, Roberto Molar-Candanosa, and Barbara Gastel

The 2016 annual meeting of the American Association for the Advancement of Science (AAAS), held 11–15 February in Washington, D.C., included many sessions wholly or in part on communicating science. In keeping with the meeting theme, "Global Science Engagement," some emphasized communication spanning nationalities, disciplines, or sectors. The following are highlights of some sessions that may especially interest science editors and those in related realms.

Using Humor to Address Serious Topics
By Iveliz Martel

People usually think of science humor as "corny jokes with bad delivery," said Amy Bree Becker of Loyola University. She explained, however, that coverage of science in political satire can help change that perception and spark interest in science. Research has shown that viewers of political satire programs such as *The Daily Show* and *The Colbert Report*—which include more science than traditional news broadcasts do—pay more attention to issues in science, technology, and the environment, she said. Becker also stated that coverage of climate change in political comedy, for example, is a useful source of climate education. "We need to encourage scientists to speak about science in comedy outlets," she concluded.

Brian Malow, curator at the North Carolina Museum of Natural Sciences and stand-up comedian, gave scientists tips on using humor when communicating science. "Be yourself, be human—and hopefully those are not mutually exclusive," he joked. "Be passionate, be present, and be prepared." Tools he identified for scientists to use in communicating science include analogies, quotations, slides with humor, and visual elements. But "do not try to be a comedian," he emphasized.

Chris Duffy, host of the show *You're the Expert* on Boston's NPR News Station WBUR, noted that he specifically asks scientists interviewed on his science humor program not to try to be funny. Making jokes is the role of the comedians on the show, who generate humor by asking scientists "dumb questions," Duffy stated. He said these questions may represent those of people in the audience who feel ashamed to ask things that may seem trivial. In contrast, "comedians don't fear people laughing at them, comedians want people laughing at them," he said. "I also tell scientists, 'We are not making fun of you. The joke is not how weird it is that you study this, the joke is how crazy it is that we don't know this.'"

Peer Review for Public Trust
By Abdulaziz Tijjani Bako

Compared with other fields, science is self-correcting and self-policing. Nevertheless, a lack of reproducibility and outright misrepresentations of scientific findings exist. One safeguard against these shortcomings is peer review. The speakers in this session explored the utility of peer review in maintaining quality, integrity, and trust in scientific findings.

Drummond Rennie, founder of the International Congresses on Peer Review in Biomedical Publication, provided a historical overview of peer review. He noted that initially, the credibility of a scientific finding largely depended on the trustworthiness of its author. Later, science began assigning credibility based on peer review and reproducibility. Today, Rennie noted, "even a fake journal cannot exist without advertising its rigorous peer review process." He further stated that in the face of growing enthusiasm for peer review in the recent years, its future "is going to be completely fascinating." However, he cautioned

CHRISTINA B SUMNERS, ABDULAZIZ TIJJANI BAKO, OMAR FABIAN, IVELIZ MARTEL, and ROBERTO MOLAR-CANDANOSA all are pursuing or recently obtained graduate degrees in science communication at Texas A&M University. BARBARA GASTEL is a professor at Texas A&M University, where she coordinates the graduate program in science and technology journalism.

CONTINUED

that this enthusiasm will be worthless "unless peer review is studied, reported, and published."

To improve the peer review process, Carole J. Lee of the University of Washington proposed that the scientific community promote a culture of credibility, openness, and transparency among authors. This "crowd mentality," she said, will make authors find it "increasingly costly not to conform to standards in the face of competitors who do."

Richard Nakamura, director of the Center for Scientific Review at the US National Institutes of Health (NIH), noted that despite its strengths, the peer review process of the NIH can benefit from improvement. He said any alternative to the current peer review process must, among other things, be impervious to gaming, be unbiased, and have high efficiency and performance.

Going Public: How Science Communicators Can Break Through the Noise
By Christina B Sumners

At this session, the panel offered perspectives on how to convey information in a world with increasingly competitive demands for audiences' attention. "For science to be effective, it has to be communicated," said Arthur Lupia, of the University of Michigan, "and the challenges to effective science communication are greater now than they've ever been." He suggested that speaking to people's core values or aspirations is a good way to get their attention.

Barbara Kline Pope, executive director of communications, National Academy of Sciences, discussed her experience creating narrative pamphlets about the value of the behavioral and social sciences. She emphasized the importance of considering the audiences' previous knowledge and experience. "We fail because brains aren't empty vessels waiting to be filled," she said. Research done to create the most effective pamphlets showed that three narrative elements—value, metaphor, and exemplar—are important for communicating science. More specifically, showing science as contributing to progress, innovation, and ingenuity (all concepts the audience already values) was very effective, as was framing the practice of science as creating maps and solving puzzles.

Marshall Shepherd, professor of atmospheric sciences, University of Georgia, said that too many scientists are comfortable only with the "ivory tower" communication style of journal articles and scientific conferences. Although establishing one's scientific credibility through these channels is important, researchers also need to learn a different style to communicate with the public, he said. One of the most vital skills is getting to the point first, he said, instead of giving a long introduction as in a scientific paper.

Can Your Lifestyle Make You Older or Younger? Metaphors for Communicating Chronic Risks
By Christina B Sumners

David Spiegelhalter, professor for the public understanding of risk, Cambridge University, presented this lecture. He began by explaining that it is relatively easy to determine the risk of a specific, one-time activity—sky diving, for example. The *micromort* is a unit of acute risk that corresponds to a 1-in-a-million chance of sudden death, and it equals the risk of simply going through a day. Historical data show that about seven of every million tandem jumps end in fatality, meaning sky diving presents about a seven micromort risk. In other words, jumping out of a plane is only about as dangerous as living through the average week.

Chronic risks are more difficult to quantify. Using the recent example of the headlines when the World Health Organization cancer agency classified processed meat as a carcinogen, Spiegelhalter critiqued media coverage of the risk. Many news articles confused absolute and relative risk, making the danger of eating bacon every morning seem far greater than it was.

Spiegelhalter suggested using metaphors that apply population risks to the individual to communicate chronic risk. For example, it seems that people respond to the metaphor of their "real age," which is their chronological age adjusted for lifestyle choices, thus making them effectively "older" or "younger."

Another effective metaphor is losing or adding time. A risk associated with a 1% decrease in life expectancy could be equated with losing about 15 minutes every day. Such a metaphor is useful for conveying the severity of a risk because research shows that people care less about losing years off their lives than they care about losing minutes in their days.

Aligning Publishing Incentives with Research Transparency and Integrity
By Barbara Gastel

In science, the drive to publish can undermine rigor and transparency in research. For example, researchers sometimes publish only "exciting" results, providing a distorted view of the findings. Speakers at this session and a preceding news briefing discussed ways to counter this problem.

Brian Nosek, of the Center for Open Science (a nonprofit company), described software his company developed mainly to help scientists manage their workflow but that also can help make scientists' work more public. Nosek said he advocated preregistering various types of research much as clinical trials are now preregistered, so the full scope of research undertaken is known; he said his company will

CONTINUED

issue one thousand $1000 awards for publishing results of preregistered research. In closing, he called for "technology to enable change, training to enact change, and incentives to embrace change."

Marcia McNutt, editor-in-chief of *Science,* said that whereas some journal policies benefit readers and some benefit publishers, we are entering an era emphasizing policies that benefit science and the scientific community. She then focused on the TOP (Transparency and Openness Promotion) guidelines, which emerged from a 2014 workshop and which over 500 journals have endorsed. These guidelines, she noted, include eight standards, each of which have four levels of stringency.

Arthur Lupia, of the University of Michigan, said that to maintain legitimacy and credibility, science must commit to greater transparency. Initiatives he noted in this regard included DA-RT (Data Access and Research Transparency) in political science. Like Nosek, he called for better instruction and more incentives to promote transparency and integrity.

Fostering Integrity in Science: An Action Agenda
By Barbara Gastel

Copies of the newly released book *Doing Global Science: A Guide to Responsible Conduct in the Global Research Enterprise* greeted those arriving at this 8 a.m. Sunday session. The session then focused on this book and related themes.

Indira Nath, of India, who co-chaired the international committee that developed this book, spoke first. She explained that the book was a project of the InterAcademy Partnership, a recently established entity bridging some 130 academies of science from throughout the world. She said the book, which includes scenarios, is intended largely for use in education and training. In discussing ways to prevent irresponsible behavior, she said that "fostering mentorship is a key mitigation strategy."

The remaining three presentations dealt more broadly with fostering integrity in research and publication. Pieter Drenth, of the Netherlands, who also served on the committee that developed the book, discussed three theories of why people breach integrity norms in research: that of the bad apple, that of the bad barrel, and that of the bad barrel maker. He then identified countermeasures based on each. Robert M. Nerem, of the Georgia Institute of Technology, noted a forthcoming US National Academies report on integrity in science. He also discussed use of cases in teaching about this realm. C. K. Gunsalus, of the National Center for Professional and Research Ethics, listed sets of factors contributing to problems in research integrity. She called for a mindset that demands integrity rather than emphasizing winning.

Doing Global Science is available online at *www.interacademycouncil.net/24026/29429.aspx*. Print copies can be obtained from the Princeton University Press.

Geojournalism: Telling the Story of Science with Data, Maps, and Sensors
By Omar Fabian

A new kind of environmental journalism is rapidly emerging. Flourishing in the era of big data and data visualization, geojournalism is helping journalists tell stories about the impacts of environmental changes faster and on a much larger scale than ever before. "It's tremendously exciting," said James Fahn, executive director of the Internews Earth Journalism Network and moderator of this session. "We've come a long way."

Twenty years ago, when Fahn was reporting on air pollution in Thailand, he and his colleagues had almost no means of collecting air-quality data themselves. They found it difficult to discern environmental patterns over areas extending farther than they could physically reach. Today, with the help of the Internet, powerful computer processors, and commercially available electronic sensors, geojournalists like Fahn can better overcome the problem of being unable to "see the forest for the trees." Quite literally in some cases.

Speaker Matt Hansen, a remote-sensing scientist at the University of Maryland, helped launch an interactive forest monitoring and alert system called Global Forest Watch. This online system enables users—journalists, scientists, and government agencies alike—to generate custom maps and analyze trends in forestation and deforestation in their local area or worldwide. Users can even sign up to receive near-real-time text alerts of forest disturbances. "The idea," Hansen said, "is to have journalists report on disturbances almost as soon as they happen—not in 1 or 2 years."

Another way this data-driven approach is transforming environmental journalism is by providing much-needed context. William Shubert, program officer, Earth Journalism Network, put it like this: In reporting on a forest fire, a journalist might feature a dramatic image of flames and smoke engulfing a woody landscape. Although arresting, the image doesn't tell the whole story. By aggregating data gathered on the ground and in the air, geojournalists can place their stories within the appropriate geographical and political context.

Effective Science Communication Strategies: Overcoming Your Expert Blind Spot
By Roberto Molar-Candanosa

Dennis Schatz, of the Pacific Science Center in Seattle, Washington, felt completely confident about his teaching skills when he taught college students. He used graphs with dots moving up and down to illustrate a star's lifecycle. But once a

student came up to him, puzzled after failing to spot "moving" stars in the sky. "I went, 'Wow, here I am talking about an abstract point on a graph, and they have taken it [to mean] a physical movement,'" Schatz said. He had been teaching without paying much attention to how his students learned.

Suzanne Gurton, of the Astronomical Society of the Pacific, joined Schatz in helping scientists strengthen their communication skills at the session "Effective Science Communication Strategies: Overcoming Your Expert Blind Spot." Gurton and Schatz led exercises, dividing the audience into groups of two to play roles of students and teachers. The exercises involved "teachers" instructing "students" to draw abstract shapes on paper—no questions or feedback allowed from students. "This is kind of the worst case scenario, where you are simply talking at your students," Gurton said.

During the exercise, the most helpful "teaching strategy" consisted of using analogies to describe the abstract shapes. Gurton emphasized, however, that scientists should use analogies that most readers will understand. A baseball analogy might not work for people who don't know about baseball, for example.

The "students'" inability to ask questions hindered communication, and the "teachers" found the lack of feedback troubling. Gurton said that when feedback is limited, scientists should observe body gestures. And if possible, they should ask questions, too.

The next AAAS annual meeting will take place 16–20 February 2017 in Boston. The theme will be Serving Science through Science Policy.