



## LETTERS

edited by Jennifer Sills

## Science Communication: Narratively Speaking

IN THE NEWS STORY BY J. COHEN "GREAT PRESENTERS: LIGHTING UP THE AUDITORIUM" (SPECIAL section on Communication in Science, 4 October, p. 78), Bonnie Bassler includes in her rules of presentation, "Tell stories." As a scientist turned filmmaker who specializes in making content meaningful and memorable, I could not agree more. But how? The power of storytelling rests in the specifics, so to answer this question, let me tell you a story.

In the fall of 2013, I was recruited to give a makeover to the plenary panel discussion for the 2013 meeting of the Coastal and Estuarine Research Federation (CERF). The organizer told me that she wanted me to do my "story thing."

Within two days, the other two presenters and I were embroiled in an e-mail battle—neither of them wanted to change their standard presentations. So I quit. But then they reconsidered, kindly assuring me that they had given enough successful presentations in their careers and could afford one debacle.

By shifting from e-mail to telephone meetings, we immediately found common ground, which grew into friendship. Acting as a stage director, I asked them—the actors—to present their material to me, and I then began shaping the new structure and focus.

We changed the title from "Responding to Sea Level Rise" to "Sea Level Rise: New, Certain, and Everywhere." We then set about crafting three "stories" around these keywords by rearranging the content to create better narrative structure. We took material that began as a list of facts (in the style of And, And, And), and we molded it into stories using the universal narrative template: And, But, Therefore (ABT) (1). Once the "But" and "Therefore" are added [a technique lifted

from "South Park" co-creator Trey Parker (1)], the format takes a shape that conveys tension and resolution—the crucial elements of a great story. For example, we streamlined the facts supporting new sea level rise into the premise: "Sea level was relatively stable for 8000 years AND coastal communities were built on the assumption of stability, BUT over the past 150 years the level has been rising. THEREFORE, a new approach to coastline management is needed." To further engage our audience, we asked scientists in advance to contribute thoughts and photographs in ABT style through the CERF Web site (2), and we incorporated their submissions into the presentation. A month later, our plenary panel packed the 1000-seat ballroom at CERF and received rave reviews (watch the video at <http://vimeopro.com/cerfvideo/cerf2013>).

My fellow presenters and I learned a lot from this. First, it is possible for an old dog to teach old dogs new tricks. Second, you get back what you invest; we had four lengthy conference calls and two rehearsals before the event. None of us had ever devoted this much effort to a presentation. Third, everyone can and should incorporate narrative structure to their science communication endeavors.

Scientists must overcome the problem of "storyphobia." Recent research shows that narrative structure enhances brain activity (3). We have created a world that is awash in information, the meaning of which could be lost if we don't work to process it through narrative structure. It

is essential for today's world of rapid communication and must become second nature to scientists to ensure effective communication.

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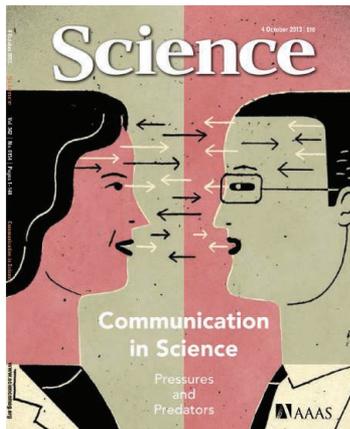
1. Randy Olson Great Challenges Day at TEDMED 2013 ([www.youtube.com/watch?v=ERB7lTvabA4](http://www.youtube.com/watch?v=ERB7lTvabA4)).
2. CERF 2013, Sea Level Rise—New, Certain, and Everywhere ([www.sgmeet.com/cerf2013/responding\\_to\\_sea\\_level.asp](http://www.sgmeet.com/cerf2013/responding_to_sea_level.asp)).
3. U. Hasson *et al.*, *Projections* 2, 1 (2008).

Science Communication:  
Power of Community

J. BOHANNON'S NEWS STORY "WHO'S afraid of peer review?" (special section on Communication in Science, 4 October, p. 60) incriminates many open-access (OA) journals. Our journal, *PLOS ONE*, was not implicated. It rejected the fraudulent paper promptly and for the right reasons, as Bohannon acknowledges. Still, the "study" was disappointing: It was not controlled, which would have required seeking to entrap a matched set of closed-access journals, yet it claims that a source of the problem is open access. It then concludes that profitability for OA journals is driven by volume, without acknowledging that the same is true for closed-access journals. The issues raised by Bohannon's exercise are not about open-

## Letters to the Editor

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Fisheries-induced evolution

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SciLifeLab Prize

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access journals; they are about science and technical publishing and the peer-review processes used throughout the industry.

In the short term, all scientific publishers have a responsibility to reinforce and strengthen prepublication review. We must improve the efficiency of peer review and continue to perform checks that uncover conflicts of interest, identify financial disclosures, confirm author affiliations, and ensure compliance with international standards of animal and human testing.

Even with these tools, peer review will never be flawless. As *Science* Editor-in-Chief Marcia McNutt points out, it is “time-honored” and the “gold standard” (“Improving scientific communication,” Editorial, 4 October, p. 13), but that doesn’t mean our methods of evaluation can’t and shouldn’t be improved. This is the real challenge. And this is why the Public Library of Science (PLOS) is working to transform scientific communication by developing better measures of scientific quality both before publication (currently traditional peer review) and after publication (currently the dreaded impact factor).

To this end, PLOS is developing article-level metrics that enable the scientific community itself to confer on a research contribution its credibility, relevance, and importance, independent of the journal in which it is published. Peer review at its best is a continual process of critique and assessment.

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## Science Communication: Quality at Stake

THE FERMENT IN THE SCIENTIFIC PUBLISHING world was nicely illuminated in J. Bohannon’s News story “Who’s afraid of peer review?” (special section on Communication in *Science*, 4 October, p. 60). Bohannon revealed how the open-access (OA) movement may have had the unintended consequence of undermining quality peer review. The proliferation of certain OA journals that publish as many papers as possible to maximize their revenue has led to the publication of much mediocre science; it has also led to

increased competition for the best papers, weakening established journals published by scientific societies, which insist on rigorous peer review. The traditional subscription-based model for financing scientific journals had the advantage of incentivizing quality: Why would a subscriber want to pay for a journal that publishes junk science?

We fully support open access. The public should have access to the science that its tax dollars fund. But it is equally important to assure quality control and to develop a new financial model that does not place the full OA page charge burden on authors.

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## Science Communication: Flawed Citation Indexing

WE USED A STRATEGY SIMILAR TO THE ONE used by J. Bohannon (“Who’s afraid of peer review?,” News, special section on Communication in *Science*, 4 October, p. 60) to uncover the dangers encountered in open-access bibliometric tools offered by Google Scholar. We uploaded fake documents authored by a nonexistent researcher to the Web to test the capacity of Google Scholar Citations and Metrics to detect false

documents and citations. As a result of these documents, the number of citations received by our research group was boosted, affecting the Google Scholar profile of 47 researchers and 52 journals (*1*). The main problem is that these tools rely on automatic indexing, retrieving any document uploaded to an academic Web domain. The controlled environment in which scientific knowledge is reasonably well controlled by peer review and journal selection processes has shifted toward an open environment in which we rely on our trust in each individual researcher’s conscience.

The pressure felt by editors and authors to perform well according to bibliometric indicators fueled by national evaluation agencies has already led some editors to artificially boost the citations received by their journals (*2*). Although fraud cannot be fully avoided by any control system, citation indexes in general, and those developed by Google in particular, should be transparent, exposing those who indulge in malpractice.

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2. R. van Noorden, J. Tollefson, *Nature* **500**, 510 (2013).

## Science Communication: Self-Publishing’s Benefits

THE NEWS STORY “THE SEER OF SCIENCE PUBLISHING” (T. Rabesandratana, special section on Communication in *Science*, 4 October, p. 66) draws attention to *F1000Research*, a

### TECHNICAL COMMENT ABSTRACTS

#### Comment on “Poverty Impedes Cognitive Function”

Jelte M. Wicherts and Annemarie Zand Scholten

Mani *et al.* (Research Articles, 30 August, p. 976) presented laboratory experiments that aimed to show that poverty-related worries impede cognitive functioning. A reanalysis without dichotomization of income fails to corroborate their findings and highlights spurious interactions between income and experimental manipulation due to ceiling effects caused by short and easy tests. This suggests that effects of financial worries are not limited to the poor.

Full text at <http://dx.doi.org/10.1126/science.1246680>

#### Response to Comment on “Poverty Impedes Cognitive Function”

Anandi Mani, Sendhil Mullainathan, Eldar Shafir, Jiaying Zhao

Wicherts and Scholten criticized our study on statistical and psychometric grounds. We show that (i) using a continuous income variable, the interaction between income, and experimental manipulation remains reliable across our experiments; (ii) our results in the cognitive control task do not appear driven by ceiling effects; and (iii) our observed post-harvest improvement is robust to the presence of learning.

Full text at <http://dx.doi.org/10.1126/science.1246799>

journal offering immediate publication with post-publication peer review and revision.

The idea of post-publication review is not new. Fifteen years ago I launched naturalSCIENCE (<http://naturalscience.com>), which offered free online publication of original research with post-publication comment. However, scientists were reluctant to contribute and publicly comment. If thinking has changed, I see little necessity for publishers or publication fees. All that is required is a science-friendly blog platform that handles scientific notation and math, edits tables, and forces standardized formatting of references. Volunteered peer reviews could be handled with standard blog comment machinery; reviewers could be required to establish their

bona fides by making their identities and scientific resumés publicly available. If revised, earlier drafts could remain available for the benefit of those interested in following the development of the paper.

However, most scientists currently still depend for advancement on publishing in high-impact journals that, whatever one may think of citations analysis, undoubtedly attract the majority of the better papers and do a great deal more than most low-impact journals to add value through reviewing, fact checking, copyediting, graphics editing, table editing, and rewriting.

If it emerges at all, science self-publishing seems unlikely to have great impact on top journals but will divert content from the

proliferating multitude of low-impact journals. Such a development could have many benefits, such as a reduction in cost of science communication; a leak-proof channel for the immediate announcement of breakthrough results; a convenient means for the dissemination of negative results; the opportunity for novice scientists to receive a wider range of advice and criticism than they could expect from the perfunctory review process used by marginal commercial journals; and a means for reviewers to receive recognition for ideas or information disclosed in the course of a review.

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## theBUZZ

### Open Access and Peer Review

For his 4 October News story "Who's afraid of peer review?" (special section on Communication in Science, p. 60), J. Bohannon investigated whether open-access journals would accept his flawed submission. His results elicited more than 200 comments, available at <http://comments.sciencemag.org/content/10.1126/science.342.6154.60>.

#### A selection of your thoughts:

...A correlation analysis between impact factor and rejection rate would have provided other important answers.  
—Eugenio Santoro

It's a shame the author did not extend the scope of his research by sending his spoof paper also to traditional, subscription-based journals!  
—Gabor Cocumelo

I am the editor of a social science journal, and this problem is not about open access or traditional publishing. It is about too many papers, overworked academics who do peer review as a courtesy, and the "publish or perish" mentality of the academic appointment system.... The entire system of academic publishing is broken. Open Access is an attempt by many to build a new system. It is unfortunate that it has been diverted from its course by those who do not share its values.  
—Peta Wellstead

...Calling the predators "open-access publishers" is a disservice, as it obscures the issue; it would be like calling pyramid scheme operators "savings & loan banks" or snake oil salespeople "physicians."...  
—Xing Chen

Bohannon does not challenge open access, and he did not criticize all open-access publishing. Determining the degree of similar problems in paper journals would require a similar study. This was not Bohannon's task. We have all seen stupidity among reviewers and authors at paper journals. What we do not see in subscription journals is the cash incentive to publish utter rubbish.  
—Ken Friedman

...Research publications have been made criteria for promotion in Indian medical institutions, paving the way for emergence of thousands of spurious journals that publish your paper for a said charge on the next day without any peer review or copyediting....  
—Venkataramana Kandi

Why is AAAS attempting to smear OA publications? Operating a sting to discredit an OA publication is not science, not journalism, and not entertainment. The authors and the editors of *Science* should feel embarrassed....  
—Ed Hinchey

...What I find most intriguing is that there is apparently no central publishing ethics board or council to do the job Mr. Bohannon's investigation clearly reveals is necessary....  
—Philip Badiz

...I have been confronted myself, repeatedly, with such untrustworthy magazines inviting an open-access paper, after I had published an article in a respectable subscription journal....  
—Peter Prudon

...It is ironic that journals that charge submission fees are excluded from this test, as this model (or membership fees) is perhaps the better model to prevent vanity publishing (as the publisher is not incentivized to accept as many articles as possible).  
—Gunther Eysenbach

...It is getting easier to parse what is important to one's research needs, and it is becoming less important where "good ideas that work" are published.  
—Kevin Henderson

...Isn't our job to read every paper with scrutiny, regardless of where it is published?...  
—Alen Piljic

...The core issue is one of oversight and the impact this may have on the dissemination of accurate information to the scientific community.... Overlooked data in one paper get passed on like a faulty gene, and each time it gets passed on, the number of people influenced by it increases....  
—Chell Price

## Science Communication: Narratively Speaking

Randy Olson

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### ARTICLE TOOLS

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