

## Feynman's incentive prizes

**I enjoyed reading** Toni Feder's news item, "Incentive Prizes Reinvented to Solve Problems" (PHYSICS TODAY, November 2010, page 21). I was a little surprised, though, that a physics publication would omit mention of the challenges Richard Feynman put forward to the American Physical Society in a talk he presented in December 1959 titled "There's Plenty of Room at the Bottom." In that talk, he made the following challenge:

It is my intention to offer a prize of \$1,000 to the first guy who can take the information on the page of a book and put it on an area  $1/25,000$  smaller in linear scale in such manner that it can be read by an electron microscope.

And I want to offer another prize—if I can figure out how to phrase it so that I don't get into a mess of arguments about definitions—of another \$1,000 to the first guy who makes an operating electric motor—a rotating electric motor which can be controlled from the outside and, not counting the lead-in wires, is only  $1/64$  inch cube.

I do not expect that such prizes will have to wait very long for claimants.<sup>1</sup>

The second prize was indeed claimed within the year, by William McLellan. But the first had to wait until 1985 when my student Tom Newman wrote the first page of *A Tale of Two Cities* in an area 6 microns square using an electron-beam column interfaced to

a Mac-2 computer to write the letters in 25-nm-wide lines.<sup>2</sup> As Feder points out, the prize money rarely pays for the research (in Tom's case, the US Army Research Laboratory did), but it nonetheless provides incentive. Tom at first wanted to frame the check from Feynman but then settled for framing a copy and spending the cash.

### References

1. R. P. Feynman, *Eng. Sci.* **23**(2), 22 (1960), available at <http://www.zyvex.com/nanotech/feynman.html>.
2. T. H. Newman, K. E. Williams, R. F. W. Pease, *J. Vac. Sci. Technol. B* **5**, 88 (1987). See also J. Dietrich, *Eng. Sci.* **49**(3), 24 (1986), available at <http://calteches.library.caltech.edu/597/2/Tale.pdf>.

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## Scientists offer opinions about their opinions

I would like to offer another wrinkle to the idea that scientific societies should not take positions on science issues of societal consequence, an idea raised by B. K. Ridley (PHYSICS TODAY, July 2010, page 10) and discussed by Alfred Bortz (September 2010, page 9).

Because scientific societies comprise individual scientists, it may be illuminating to look at how individual scientists approach the matter. During my four years in the communications department at Woods Hole Oceanographic Institution (WHOI), I saw a small minority of scientists taking public positions on science issues of societal consequence. That low participation may have come from multiple drivers: WHOI's soft-money culture, which emphasizes the securing of funding for the next project; fear of appearing to grandstand and therefore of being one protruding nail that needs to be hammered down; or a concern for being misinterpreted or overinterpreted. Perhaps most significantly, there was a great concern that taking public positions would ultimately compromise the abil-

ity to do impartial science. As soon as you take a position, you risk becoming an advocate for something that may turn out not to be scientific truth.

The wrinkle I offer is that I discovered many scientists would be marginally comfortable offering their opinion if asked but saw it as an entirely different thing to initiate the expression of their opinion. Passive participation was OK; active was not.

A case in point was the 2004 opening of the science fantasy film *The Day After Tomorrow*, in which the cryosphere goes global in about 90 minutes. Thermodynamic impossibilities aside, at last Hollywood was using the term "paleoclimatologist," and we at WHOI had a chance to capture the public's attention, riding on science-fantasy coattails as the science fact-tellers.

I met with a handful of climate scientists before the film opened and discussed how we, as an institution, might take advantage of the moment. The scientists all wanted to run, not walk, from such foolishness. Yes, they would take calls from the media, but no, they wouldn't put their names on any statement or op-ed. It would sully their reputations and risk eye-rolling, or worse, from scientist peers: "How could so-and-so take this Hollywood drivel seriously?"

So we passed. *The Day After Tomorrow* came and went. We posted a climate change FAQ to our website and waited for the phone to ring. As I recall, it never did.

To me, the moral of the story is that most scientists not only have few incentives to take positions on how society might act based on science findings, they have abundant disincentives to do so, mainly in the form of peer censure and risk to credibility. In the end, if one can't move the individuals on an issue, it will be difficult to move the professional societies they constitute.

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**If it really is hubris** "for a committee, however distinguished its membership, to pontificate on scientific matters," as B. K. Ridley asserts, then it is

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