letters

The wizard's legacy

I'm grateful to Frank Wilczek for the enjoyable Reference Frame story about Don "Mr. Wizard" Herbert (PHYSICS TODAY, January 2008, page 8). I was born in 1951, and I remember watching Mr. Wizard from my earliest years. My mother is far from a science person, but she somehow knew that watching his show was a good thing for me.

Don Herbert helped make Wilczek into an acclaimed physicist and physics writer and me into a high-school physics teacher. During 34 years of teaching, I have helped numerous students learn the value and joy of scientific curiosity, thanks in part to Mr. Wizard.

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Thank you for the item on Don Herbert, TV's Mr. Wizard. His science of everyday things never ceased to hold my childhood attention and was a major influence that eventually led me to a career in engineering. When his show was about to be canceled in the late 1950s, I asked my father to help me write a letter of protest to the network. I was elated when we read in the newspaper that the show was to be renewed the following year.

It would be hard to single out my favorite episode, though I do remember the toy steam engine that ran while it was all frosty and obviously quite cold. The challenge, to figure out what was going on, was a simple but very effective lesson in thermodynamics. We learned at the end of the show that the steam engine's boiler had been filled with freon that was boiling off and driving the engine.

Thank you, Mr. Wizard, for many an enjoyable, informative, and challenging program.

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Frank Wilczek's references to greater and lesser wizards are true with respect to the Wizard of Oz, a prototype of tricksters who fits the first definition of a wizard. As a grandmother, retired librarian, and fan of the Harry Potter books, I differ with Wilczek's assessment that fictional conceptions like Harry Potter "tend to legitimize intellectual passivity and wishful thinking."

In the books, J. K. Rowling's protagonists must think how to use their skills—albeit magic ones—to solve a series of problems, some of them life threatening. True, wishful thinking has sometimes helped them, but they are actively seeking answers. They have solved problems with the best available information and sought additional information to help as well.

Potter's being a wizard is different than Don Herbert's; I agree Herbert was a real-world wizard without peers. Herbert's magic was twofold: He was not only a scientist but a skilled instructor. His wizardry opened worlds.

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Credentials and conformity

I applaud and agree with William Aghassi (PHYSICS TODAY, October 2007, page 12) when he writes, "In today's physics community only credentials and conformity count." Actually, credentials also mean little today, unless your research is in a trendy topic like string theory and you write from a famous university like MIT, Cambridge University, Imperial College, or Caltech. Gatekeepers and editors shun originality.

In his book *The Einstein Decade, 1905–1915* (Academic Press, 1974), physicist Cornelius Lanczos commented, "How fortunate that someone of the calibre of [Max] Planck was editor of *Annalen der Physik* [in 1905]. . . . Today none of these papers would see the light of day!"

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Schrödinger solution for the Morse oscillator

In his review of Ilya Kaplan's book, *Intermolecular Interactions: Physical Picture, Computational Methods, and Model Potentials* (PHYSICS TODAY, July 2007, page 64), Lucjan Piela criticizes Kaplan for saying that the well-known solution of the Schrödinger equation for the Morse oscillator is approximate. The reviewer says it is exact. Actually, Kaplan is correct. The solution corresponds to an unphysical boundary condition that the wavefunction vanishes at an internuclear distance of minus infinity. The exact solution for a diatomic molecule would correspond to the wavefunction vanishing at the origin. The difference is large enough that it needs to be considered in practical work, especially for the hydrogen molecule.

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Piela replies: The Morse oscillator is a single point mass subject to the Morse original potential cited in Ilya Kaplan's book, equation 5.22. Contrary to what Donald Truhlar writes, the Morse oscillator does not represent two point masses with a spring, not to mention a diatomic molecule. Therefore, Kaplan's equation 5.23 is an exact solution of the

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Schrödinger equation for the Morse oscillator. The same solution is, of course, an approximate one for the Schrödinger equation for two point masses with a Morse-like spring or any real diatomic molecule.

Truhlar could literally repeat his arguments for the harmonic oscillator, instead of the Morse one. His conclusion in such a case would mean that the widely known solution to the Schrödinger equation for the harmonic oscillator is not exact.[1]

Reference

1. L. Piela, *Ideas of Quantum Chemistry*, Elsevier, Amsterdam (2007), p. 239.

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Bits on *Quantum Information*

I was honored to see my book *Quantum Information: An Overview* (Springer, 2007) reviewed alongside David Mermin's masterful new textbook (*Quantum Computer Science: An Introduction*, Cambridge University Press, 2007). However, I was disappointed by reviewer Barbara Terhal's facile and inappropriate approach (PHYSICS TODAY, March 2008, page 54).

Terhal states, "The preface of the book speaks of his intentions: to write a text that provides an overview of the fundamentals of the field." However, my intent, which was thoroughly laid out in the preface, goes far beyond that characterization. As a result, my necessary constraints on the book are misrepresented and underappreciated. In particular, I made it clear that the book was intended as "a handy reference . . . that also treats foundational aspects of quantum mechanics connected with quantum information science." Unlike Mermin's excellent monograph, mine was never intended to serve as an easily read introduction to the field or to provide unique insight. An overview such as mine cannot be the same thing as a textbook and should not be evaluated as one.

Terhal further complains that the monograph contains little by way of personal insight, but that point was made clear both in the foreword by Tommaso Toffoli and in the preface. When presenting a subject as nascent and controversial as quantum information science, it is a good idea, particularly in the case of an overview, not to inject too much of oneself.

More surprisingly, after recognizing that my book does provide a comprehensive overview of this rapidly expanding area, the reviewer questions "whether there is an audience for such encyclopedic texts, especially given the easy access to online sources of information such as the arXiv e-print server and Wikipedia." That question is relatively easily answered: Yes, there is periodically a need for a concise and comprehensive monograph that is above the anarchy and distortions on Wikipedia and to a lesser extent the e-print servers and that can serve those with mathematical training and limited free time to cull accurate treatments from the Web.

Moreover, because quantum information science is an area that transcends physics itself, the physics itself can sometimes be distorted, a situation more prevalent in online offerings such as Wikipedia and e-prints. Can one seriously rely on Wikipedia and e-print servers as clear and valid guides to the foundation and breadth of quantum information science? Are those the sources where researchers outside the area can obtain an organized overview of the subject? The unevenness and unreliable nature of the perspectives offered on free portions of the Web are reasons why I chose to write *Quantum Information* in the first place.

Another aspect of my monograph, also clearly noted in its preface, is that the book discusses "a number of pertinent . . . results from earlier decades of the twentieth century . . . because they will likely prove important to future progress in both quantum mechanics and information theory.'' Terhal's only mention of that aspect was apparently her reference to the unspecified portion of the text she considered "mathematical and superfluous detail." My reason for including that extra material is to show the extent to which quantum information science is grounded in fundamental physics and is capable of making great contributions to quantum foundations, provided the physics remains squarely in view.

Like a standard quantum measurement, the effect of this lukewarm book review is, in all likelihood, irreversible. Fortunately, though, many who have carefully read the book's preface and who, therefore, have understood the entirety of its purpose and constraints have expressed their satisfaction with the book over the 16 months since its publication. Those readers have been glad to have a reliable source to guide them into this exploding body of literature.

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Policy analyst or crusading journalist

In the December 2007 Issues and Events story entitled "Climate Changes for Peace Prize Winners" (PHYSICS TODAY, December 2007, page 22), the author twice quotes George Monbiot on the nature of the Intergovernmental Panel on Climate Change and the current status of the debate on global climate change. He is identified as "an environmental policy analyst at Oxford Brookes University in the UK." This is a misleading description. Monbiot's claim to prominence is based on his activities as a crusading journalist for a variety of broadly left-wing causes and on his political activism in the antiglobalization movement. I doubt that he himself would claim to be an objective academic, which is, nevertheless, the impression created by the PHYSICS TODAY piece.

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Making lemonade in the library

George Kattawar's review (PHYSICS TODAY, February 2008, page 64) of the book *Iridescences: The Physical Colors of Insects* by Serge Berthier (Springer, 2007) may have set a record for the number of negative comments. After a brief review of the author's previously published French version, Kattawar goes on to point out that "Berthier's book could have been a very nice piece of work if it had been proofread to correct the plethora of errors in grammar, history, and references to figures." And that is only the first sentence of about 15 column inches of critical comments.

One wonders if there should be a lemon law for books.

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