

physics department, encapsulates the essence of the scientific method. I know such an ideal is infeasible on so many levels, but I believe that the world would be a much better place if everyone, not just every physicist, were to read the book as part of an undergraduate education.

We might want to revisit Bevington as an exemplar not just of scientific-method education but of meta-instruction in effective pedagogy in general. Phil Bevington seems to have struck the perfect balance of detail, rigor, practicality, and clarity.

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Neckties or not, and a quick fix

I appreciate Brian Kraus's review of my book *Real Scientists Don't Wear Ties: When Science Meets Culture* (PHYSICS TODAY, March 2020, page 52). The photo spread of diverse physicists mostly not wearing ties underlines a point I made in the book: More than ever, we physicists look different from each other and dress the way we want to. However, I must correct an error Kraus made when he wrote that I retired from academia in 1990. As I stated in my book's introduction (page xi), I continued academic research and teaching until 2011, when I retired as Charles Howard Candler Emeritus Professor of Physics after 42 years at Emory University.

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A physicist out of academia

The commentary from Elizabeth Frank (PHYSICS TODAY, October 2019, page 10) about her career move from academia to industry resonated with me in many ways. I largely agree with Frank's statement that "you don't have to justify your motivations to anyone but yourself," but I also point out that career changes can deeply affect one's family.

As Frank mentions, physics professors often have limited awareness of opportunities outside academia; therefore, input from someone with a career like mine is important. My path is significantly different from Frank's, and I speak from later in life. Furthermore, the variety of careers available to physicists is much greater outside academia than within.

My experiences in academic physics began when I was a precocious elementary school student and grew through wonderful experiences at Harvard, Princeton, and Stanford Universities to a tenure-track assistant professor position at the University of Massachusetts Amherst. At Harvard, I had strong physics courses and valuable interaction with renowned physicists, including my adviser Norman Ramsey. At Princeton, I completed a PhD in experimental high-energy physics in less than four years.

During my postdoc at Stanford in the early 1970s, I had the good fortune to work at SLAC on two experiments that led to Nobel Prizes—one for Burton Richter and one for Martin Perl. I then took a tenure-track assistant professorship at UMass, where I continued the work at SLAC while helping a local UMass team start an experiment at Brookhaven National Laboratory. All was going well.

Nonetheless, at age 30 I had a midlife crisis and decided to move from academia to industry. To Frank's point, the switch was deeply personal. At least three factors contributed to my malaise. First, I felt locked into my high-energy-physics specialty and was concerned about its future. The significant projects were getting much bigger, taking much longer, based in more distant laboratories, and producing increasingly arcane results. It seemed harder all the time for me to continue to derive personal satisfaction from the field.

A second factor was that as an experimenter, I felt that I should understand the theories pertaining to my experiments, but they had reached a level of abstraction beyond my comprehension. Third, I was concerned about the 1970s energy crisis associated with the Arab oil embargo, and I wanted to help address it. I landed a job at the GE Research and Development Center in Schenectady, New York. My wife was shocked but supportive: Our two children were young and portable, and her career actually benefited from the move.

My experiences in industry during 37 years with GE were also wonderful, but in different ways from my time in academic high-energy physics. My work at GE was mostly in lighting technology. After a decade I moved to the headquarters campus of GE Lighting in Cleveland, Ohio. I have done research that has been published in refereed journals. It has always been on problems with near-term, real-world significance. I have also worked on developing and producing new energy-saving lighting products.

Every few years my role morphed as the business changed and new needs arose. Those changes were invigorating as I gained new insights. I often started new assignments with little of the requisite technical know-how, but I was a quick learner with a background in basic physics and wonderful, talented, and technically diverse coworkers. The business funded the work, with no external grant proposals needed. I have had plenty of opportunity to teach, and I have enjoyed it. Toward the end of my career at GE, I was involved in the LED technology revolution. Since retiring, I have developed a successful consulting business that draws heavily on technical knowledge of light sources.

I look back to my decision at age 30 as the most important one of my career. On the one hand, academia *might* have provided better opportunity for long-term career focus and development of deep expertise. On the other hand, industry *did* provide stimulating work with near-term, beneficial, real-world significance. It also offered invigorating career and assignment changes. I have never regretted my decision, but I will never know where the path not taken might have led.

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