InFocus | *The Virtues of Ignorance*

By Jon A. Schmidt, P.E., SECB

My title this month comes from a collection of essays that resulted from a June 2004 meeting in Matfield Green, Kansas, which is a small town in the Flint Hills – one of my favorite landscapes – roughly a two-hour drive from my home. Edited by Bill Vitek and Wes Jackson, The University Press of Kentucky published it in 2008 with the subtitle, *Complexity, Sustainability, and the Limits of Knowledge*. The SEI Engineering Philosophy Committee was intrigued by the book's provocative name and decided to read and discuss it together. What follows are some of my own reflections.

The overall premise is that the scientific revolution prompted by the development of modern philosophy, most notably by Descartes and Bacon, was (and still is) driven by a Knowledge-Based Worldview (KBW). Charles Marsh actually traces it all the way back to the ancient Greeks and suggests that, in retrospect, Isocrates (a leading Sophist) had it right, while Socrates, Plato, and Aristotle (the "true" philosophers) all had it wrong – much like the assessment of Steven L. Goldman regarding the inferior status of engineering in Western culture ("The Principle of Insufficient Reason," May 2008). The editors' introduction describes KBW as "the merger of *techne* (the everyday knowledge gained by experience and repetition with little regard for how and why) and *episteme* (the knowledge that comes from the rational pursuit of causes and first principles)" (p. 2).

Of course, I call these technical rationality and theoretical knowledge, respectively; and conspicuous by its absence is *phronesis* or practical judgment ("Virtuous Engineering," September 2013). Anna L. Peterson wrote the only chapter specifically about ethics, classifying consequentialism and deontology – which she calls "rule-based ethics" – as "knowledge-based ethics" and criticizing them accordingly. Aristotelian virtue ethics, in particular as revived by Alasdair MacIntyre ("Rethinking Engineering Ethics," November 2010), is one of her examples of "ignorance-based ethics" because of "its insistence that moral judgment need not wait for full knowledge and … the admission that ethics always entails uncertainty" (p. 130).

Each of the other chapters likewise argues, in its own way, for an alternative Ignorance-Based Worldview (IBW) and explores what it might look like. As the various authors are careful to clarify, what they advocate is not so much ignorance itself, but admission of the degree to which ignorance is an unavoidable aspect of the human condition; that is, we must acknowledge the limits of our knowledge. Even so, Robert Root-Bernstein notes that "you have to know what you do expect before you can be surprised by what you didn't expect … You have to be prepared to recognize your ignorance if you are to benefit from it." As Vitek summarized, "If knowledge is a tool, ignorance is a perspective." What beneficial insights might such a perspective provide?

One recurring implication is avoiding the hubris that all too often has accompanied our supposed mastery of nature. Wendell Berry calls this "arrogant ignorance" and goes on to identify several other kinds – inherent ignorance, historical ignorance, willful ignorance, materialist ignorance, moral ignorance, confident ignorance, fearful ignorance, for-profit ignorance, and for-power ignorance. Paul G. Heltne narrows it down to just two: imposed ignorance and humble ignorance. The former is operating whenever we "are made to feel that it would be foolish to ask questions about derived conclusions or about basic assumptions." By contrast, the latter is "filled often with the joy of discovery and wonder at what is discovered."

In other words, as summarized by Peter G. Brown, "Ignorance is another name for humility, humility before the mysteries of life and the universe." This extends even to our most sophisticated scientific and philosophical pursuits: "Since theories and concepts are always simplifications of reality, they will never be as complex as reality itself." Two different chapters go so far as to state, "The greatest single achievement of science in this most scientifically productive of centuries [the 20th] is the discovery that we are profoundly ignorant. We know very little about nature and we understand even less." Ironically, they cite two different sources for this quote – Lewis Thomas and Ann Kerwin – suggesting ignorance in at least one case of its true origin.

Craig Holdredge develops this notion further, observing "one fundamental bias that infects modern Western culture: the strong propensity to take abstract conceptual frameworks more seriously than full-blooded experience." He recommends that we "open up our perceptual field by trying to put the conceptual element in the background," thus "acknowledging our ignorance and maintaining … intellectual modesty," which "demands changing not only the content of our concepts but also their form or style." This is difficult because the tendency to abstract – to think in terms of simplified models – is ingrained into us throughout the educational process, such that we rarely even realize that we are engaging in it.

As is often the case, I will conclude by asking: What does this have to do with engineering? I would say that engineers are explicitly trained to affirm our ignorance and take it into account. In fact, we do so routinely – although we usually call it uncertainty, rather than ignorance. As I have said (and written) many times, the most important thing for any engineer to know is what he or she does not know. One version of my favorite summary of our profession ("The Definition of Structural Engineering," January 2009) says that we should practice it "in such a way that the public at large has no reason to suspect the extent of our ignorance"; however, we most certainly need to be very well aware of it ourselves.▪

*Jon A. Schmidt, P.E., SECB (**chair@STRUCTUREmag.org**), is an associate structural engineer at Burns & McDonnell in Kansas City, Missouri. He chairs the STRUCTURE magazine Editorial Board and the SEI Engineering Philosophy Committee, and shares occasional thoughts at **twitter.com/JonAlanSchmidt**.*