



The Definition of Structural Engineering

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

In the September 2008 issue of STRUCTURE® magazine (“Philosophy and Engineering”), I quoted a definition of structural engineering that I have seen attributed to various individuals and speculated that no one knows for sure who actually originated it. As it turns out, this was the third time that a different version of the same quote has appeared in STRUCTURE – John Mercer mentioned it in the August 2006 issue (“The ‘Art’ of Structural Engineering”), crediting Doug Loos; and Horst Berger invoked it in the November 2007 issue (“Structural Form in Architecture”), citing “a leading structural engineer” several decades ago. Prompted by a reader comment, I decided to research the matter further and report my findings.

I first came across the quote in an article by Sharon Beder entitled “The Fallible Engineer,” which appeared in the November 2, 1991 issue of *New Scientist*. She had found it in a discussion paper called *Are You at Risk: Managing Expectations*, which the Australian Institution of Engineers distributed to its members the previous year. That document indicated that the definition came from Dr. A. R. Dykes in the 1946 Chairman’s Address to the Scottish Branch of the Institution of Structural Engineers (IStructE). The language was basically what I used in my InFocus column: “Structural engineering is the art of modelling materials we do not wholly understand into shapes we cannot precisely analyze so as to withstand forces we cannot properly assess in such a way that the public at large has no reason to suspect the extent of our ignorance.”

The reader who sparked my curiosity – Erik A. Nelson, occasional contributor to STRUCTURE magazine’s “Outside the Box” column – also suggested Dr. Dykes as the source, but thought that the quote was from a 1976 address to IStructE. In fact, this is the most common citation on the Internet, but the difference in dates – exactly 30 years – made me suspicious. As it turns out, Dr. Dykes was actually the 1977-1978 Chair of the Scottish Branch of IStructE and did use the quote in his Chairman’s Address. The May 1978 issue of IStructE’s official journal, *The Structural Engineer*, summarized the talk on pages 150-151 and included the following: “Structural Engineering is the

Art of moulding materials we do not wholly understand into shapes we cannot precisely analyze, so as to withstand forces we cannot really assess, in such a way that the community at large has no reason to suspect the extent of our ignorance.”

Some websites attribute the quote to James E. Amrhein, former executive director of the Masonry Institute of America and author of the *Reinforced Masonry Engineering Handbook*. When I contacted him about it, he confirmed that he frequently uses it in his lectures and almost always gets a good response to it. However, he said that he found the quote many years ago and would like to acknowledge its author, but unfortunately, he does not know who that was.

Ultimately, the earliest example of the quote that I could find was in a 1967 British textbook, *Structural Analysis Volume One*, by Dr. E. H. Brown. His version is a bit simpler than the others, which is often the case with a text that is closer to the original: “The art of moulding materials we do not really understand into shapes we cannot really analyze, so as to withstand forces we cannot really assess, in such a way that the public does not really suspect.” This is essentially how Horst Berger stated it in his article, and the conference at which he remembered hearing it occurred in Chicago in 1970.

In light of all of this, here is my best guess at where credit is due:

- Dr. Brown was likely the person who created the quote, or at least was the first to popularize it.
- Dr. Dykes was probably responsible for the modification of the quote into its longer, less repetitive form.
- Mr. Amrhein has raised awareness of the quote throughout the United States structural engineering community.

Regarding the quote itself, I still believe that it accurately captures the essence of the challenge that structural engineers face every day. Although part of our job is to prevent the public from suspecting the extent of our ignorance, we ourselves have a serious responsibility to be ever mindful of it – and to take it into account accordingly. ■

Join the Discussion

The Executive Committee of the SEI Business and Professional Activities Division is considering the establishment of a new Philosophy Committee. Its objectives would be to investigate how each branch of philosophy applies to structural engineering, and to explain how philosophy is relevant to current issues in the profession. If you would be interested in getting involved in such an effort, please contact the author at jschmid@burnsmcd.com.

Your Turn

There are several different versions of the definition of structural engineering that is the subject of this article. Which one (if any) do you prefer? What other thoughts do you have about this (only somewhat) tongue-in-cheek description of our profession? Submit your responses by clicking on the 'Your Turn' button at www.STRUCTUREmag.org.

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