InFocus

thoughts from a member of the Editorial Board

Intelligent Design

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

Biologist Richard Dawkins, an outspoken advocate of the theory of evolution, made this statement at the beginning of his book, *The Blind Watchmaker*: "Biology is the study of complicated things that give the appearance of having been designed for a purpose." Other reputable scientists take the position that these "complicated things" must, in fact, have been "designed for a purpose" because they exhibit certain characteristics that cannot possibly be attributed to natural causes. Their alternative theory has come to be known as "intelligent design".

This is not a magazine about biology or, for that matter, theology, so I have no intention of delving into the merits of these two schools of thought regarding the origin of life. However, I do want to discuss some ideas about what would constitute a reliable indicator that something is the result of a designing intelligence, because I think that it has some relevance to the professional practice of structural engineering.

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At a crime scene, how do the investigators identify evidence of intentional human activity? During an archaeological dig, how do the participants determine whether something that they have encountered is an artifact that should be preserved? In the search for extra-terrestrial intelligence, how do radio astronomers differentiate between attempts at interstellar communication and simple background noise?

The last example is illustrated vividly in the 1997 movie "Contact", which is based on a 1985 novel of the same name by Carl Sagan. A sequence of pulses is detected, coming from the direction of the star known as Vega. After listening for a while, the characters realize that the pulses are grouped–2, 3, 5, 7, 11, 13, 17, 19, 23, and so on; in fact, all of the prime numbers through 101. Then everything starts all over again. How do they recognize this as something deliberate and meaningful, rather than random and irrelevant?

The answer, according to mathematician and philosopher William Dembski, is something called "specified complexity". Complexity is basically a synonym for improbability, while specification carries the idea of conforming to an independently given pattern. A single letter of the alphabet is specified without being complex. A long sequence of arbitrary letters is complex without being specified. A sonnet by Shakespeare is both specified and complex – and so is a building, bridge, or other structure.

Of course, all of us are quite comfortable talking about "specifications", and complaints about the increasing "complexity" of codes and standards are all too common these days. This being the case, what constitutes "intelligent design" within the context of structural engineering in the early 21st century?

I think that a big key is exactly how we go about specifying complexity in our projects; in other words, the preparation of structural construction documents that are coordinated and complete. Needless to say, this is the goal of CASE Document 962 D, *A Guideline Addressing Coordination and Completeness of Structural Construction Documents*. The issue is not so much the technical aspect of design, but rather how the results are passed on to others – especially contractors, who are responsible for turning our concepts into reality.

CASE 962 D suggests several possible reasons for a perceived decline in document quality in recent years:

- Educational requirements – the typical number of credits necessary to graduate has gone from 156 in the 1970s to only 120 today.
- Reduced design fees – studies have shown that compensation has dropped by as much as 20%, while the work required to produce a comparable project has decreased only marginally.
- Increased utilization of technology – computer-aided design and drafting improves productivity but diminishes the ability to get a "feel" for the structure and exercise careful oversight of subordinates.

The rise of Building Information Modeling (BIM) may only exacerbate the situation, especially if BIM data is passed directly to the construction team and the traditional submittal review process is curtailed or abandoned altogether for the sake of "efficiency".

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CASE 962 D goes on to make a number of common-sense recommendations for improving the situation:

- Explicitly define responsibilities within the design team.
- Implement effective communication at every stage of the design and construction process.
- Coordinate the documents, both within each discipline and across all disciplines.

So, the way I see it, "intelligent design" is not necessarily a matter of producing "better" structures; it has to do with accurately translating the complex specifications that we develop in our minds into something that can actually be built. What about you? What do you think constitutes "intelligent design"? Please share your thoughts with us.▪

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