



LYLE'S LAWS

Lyle's Law of Grandchildren

IT HAS BEEN SAID that design, in its fullest sense, is the essence of engineering. This fascinating process of defining a product, applying the tools of analysis and synthesis to create what has never been, evaluating an array of possible implementations of this idea and finally choosing and implementing the *best* of these is little understood by non-engineers. It is, however, our very life.

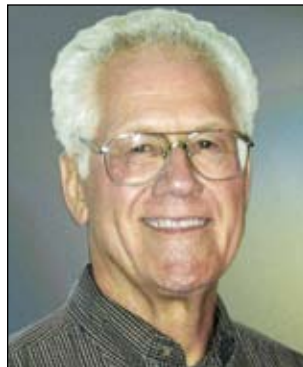
Over the past three or four decades, engineering educators have gradually, if not always cheerfully, embraced the teaching of design in the undergraduate curriculum. Encouraged by ABET, the organization that accredits engineering-degree programs, educators started introducing open-ended problems with multiple solutions and eventually teaching—or at least modeling—the process of evaluation and selection. It is this final step—evaluating various designs and deciding which one to implement—that is the subject of Lyle's Law of Grandchildren.

Design every product as if your grandchildren were going to use it.

A three-word description of the design-and-produce process is "Innovate. Evaluate. Actuate." To innovate is to come up with new combinations of whatever it is you work with: wheels, amplifiers, gears, sensors, chemicals, pumps, airfoils, fan blades, whatever. To evaluate is to determine the parameters by which the goodness of this new combination will be judged and to assign value to each of those parameters. To actuate is to compare and balance those values and make a choice as to what the final design will be and then to build and perhaps produce this new product. It is at the intersection of the last two steps, evaluate and actuate, that Lyle's Law of Grandchildren finds its application.

What parameters will you use to evaluate your design? I would wager that one parameter will be cost. Then there are speed, power, energy efficiency, safety, environmental impact, etc. Talk about apples and oranges—and grapefruits and turnips and kumquats. How do you trade off one of those against the other?

Well, the value judgment often comes down to a values judgment. And that's where Lyle's Law of Grandchildren comes in. Make these decisions as if your grandchildren will be using the product. Of course, it doesn't have to be grandchildren. It could be your parents or your cousin George or your Aunt Ida. The important thing is that you consider the user to be a real person who really matters to you and not just an abstraction. Because the product will be used by—or at least will have an effect upon—lots of real people.



Design every product as if your grandchildren were going to use it.



The first reaction to this principle is probably, "Well, if this is for my grandchildren, I'll concentrate on making it completely safe." Unfortunately, that is likely to make it so expensive that your grandchildren can't afford to use it—or so cumbersome that they won't want to. So of course, we are back to making trade-offs—trade-offs that are informed, however, by the assumption that the product will be used by someone near and dear to you.

We hear a lot about corporate greed and, from time to time, about engineering decisions being made on purely economic or market-based considerations. Certainly there have been many such cases. In the main, however, I believe that most of us want to do what is right. But in the world of technology, those corporate managers who happen to have had non-technical educations may be ill-prepared to decide what *right* is in the area of product design. They will, of course, know it is right for the company to show a profit, but that alone does not assure long-term company success. Engineers need to be judicious in making the decisions that are within their own power, but, beyond that, they also have a responsibility to provide management with a *grandchild-sensitive* analysis and to help them think in terms of real people. Is that the application by proxy of the Law of Grandchildren? Whatever, I think the general welfare is advanced if decisions are made while considering real people instead of some abstract *user*.

This brings me to a corollary of this law that I call the Grandma Rule. Everyone is

Photo compliments of the descendants of those pictured: (from top to bottom) Isabelle Foster Earp Bell, Melissa Earp Overstreet, Madge Isabelle Overstreet Pearce, Marvel Pearce Bruce. Photo was taken about 1918.

familiar with the Golden Rule, variously stated in various cultures but usually seen as “Do unto others as you would have them do unto you.” Pretty good advice. The Grandma Rule, however, holds you to an even higher standard.

Do unto others as you would have them do unto your grandmother.

Most people, I think, would be willing to suffer a level of indignity or inconvenience that they would not want their grandmother to experience. This tightens up the specifications on “Do unto others...”

We are living in a time when civility seems to be on the decline. While it may be argued that it has always been thus, even those who so argue will, I think, agree that interpersonal relations could use some improvement. Road-rage incidents are common and lead to a number of traffic deaths every year. The *shock-jock* radio programs and the television shouting matches that are supposed to pass as dialogue are models of incivility. (I would, however, suggest that they have had a beneficial effect in that they have driven many people away from the electronic media into the arms of good books.) Yet they continue to prosper and seem to attract audiences, probably of people who will emulate the behavior they hear and see. Surely this is not the way the performers or their audience would like their grandmothers to be treated. Can we get them to apply the Grandma Rule?

In the end, of course, the Law of Grandchildren and the Grandma Rule do not provide objective procedures to be followed. A design involves dozens of small decisions made over a period of time. Our interpersonal relations are dozens of small actions taken day after day. The important thing is that these decisions and actions be taken as if they had a direct effect on some real people who are dear to us. Because eventually they will.

—Lyle D. Feisel, Ph.D., P.E.
Iowa Alpha '61

(Fellows, continued from page 35.)

Tau Beta Pi Fellow No. 757

Stephanie I. Wilson, E.I.

Stephanie is a chemical engineering graduate of the University of Tennessee at Chattanooga. She hopes her career will culminate in academic or governmental laboratory research. She plans to pursue her master's degree in chemical and biomolecular engineering at the Johns



Hopkins University. She defended her undergraduate research thesis before a committee of professors and was awarded highest honors. This project gave her experience in several technologies, including computational fluid dynamics. Her undergraduate research poster won second place at an AIChE national conference. Her research work prompted a job offer from a pharmaceutical company, which she declined in favor of beginning graduate school. Her preparations for graduate school included microreactor research work, plus classes in C++, computational dynamics, and advanced biology. Stephanie was President of her Tau Beta Pi Tennessee Zeta Chapter.

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(Scholars, continued from page 45.)

Joshua D. Wood, *Record Scholar No. 330* Josh is majoring in computer engineering and minoring in mathematics, physics, computer science, and business administration at Valparaiso University. He plans to pursue multiple master's degrees. Tau Beta Pi Cataloger and



member of the IEEE and Lambda Chi Alpha, he has researched quantum computing and evolutionary algorithms.

Loren Yu, *Record Scholar No. 331*

Loren is a dual major in C.S. and mathematics at Stanford.



Eventually, he would like to be a manager in a software company or perhaps start a firm of his own. He is very interested in artificial intelligence and theoretical computer science. He will decide which area to pursue before he begins graduate school.

J. “Alex” Zhang, *Record Scholar No. 332*

Alex is a Ch.E. major at Yale University and is a candidate for the simultaneous award of bachelor's and master's degrees. He will take the fundamentals of engineering examination next year. After that, he may begin work on an M.B.A. He is a member of the AIChE and President of his Tau Beta Pi Chapter.



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