

LYLE'S LAWS

Lyle's Law of Why

We had been studying Spanish for a few days when our teacher led us through an exercise in which our task was to say—in Spanish, of course—that we liked or did not like various things. For instance, if I liked ice cream—which I do—I would say, “*Me gusta helado.*” If I didn’t like chocolate—which is, of course, ridiculous—I would say, “*No me gusta chocolate.*” The teacher’s primary goals were to drill us in the use of *no* as a negation and to help us expand our vocabulary of nouns.

One student, though, asked why we used *me* (pronounced *may*), the Spanish word for *me*, instead of *yo*, the Spanish word for *I*. The teacher’s response was, “*Well, that’s just the way it is.*” And we went on our merry way gusta-ing this and no-gusta-ing that.

But I was troubled. There may be a few things that come without explanations, but I can think of nothing that comes without a reason. Surely our teacher knew why the sentence was so structured, and I wish he had taken the time to give us the reason. This and other similar experiences have led to the formulation of Lyle’s Law of Why, the first part of which is, For everything there is a reason.

At first blush, this may seem like a trivial observation—at least to engineers and scientists. I am always surprised, though, at how many people are satisfied with the “*Well, that’s just the way it is*” response. Or, if they do believe there is a reason, either conclude that the reason is not knowable or, even worse, settle on a reason that is incorrect. Logical, but incorrect.

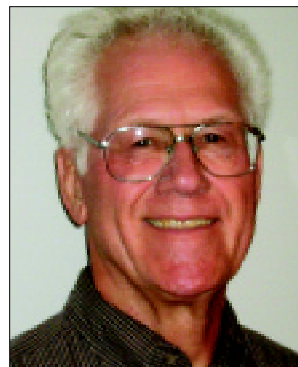
One day, when I was a college freshman, my English teacher started class with a pop quiz that consisted of a single question; what does “*post hoc, ergo propter hoc*” mean? Well, I hadn’t studied Latin—nor had I read the day’s assignment—or I would have known that it means “*After this, therefore because of this.*” It is a classical fallacy of logic wherein one incorrectly concludes that because Event A preceded Event B, Event B is a result of Event A. Well, who would fall for that? Let’s stay with Latin for a bit.

Recently I read an AP article that described the comeback of Latin as a high-school subject. While I think this is a good thing, I was a bit troubled by some of the statistical conclusions used to tout as the benefits of studying the language. The story reported that in 2002, high-school students who had studied Latin had a mean score of 559 on the verbal SAT, while those who had studied French achieved 524 and Spanish, 501. The conclusion was that studying Latin raises a student’s verbal score. In my humble opinion (probably not as humble as it should be)

the data do not support that conclusion. I would suggest that there is likely a significant student self-selection process, which results in Latin classes being populated by people who are already verbally adept. *Post hoc, ergo propter hoc?* Not necessarily.

This leads me to round out **Lyle’s Law of Why** with the addition of another phrase: *For everything there is a reason, but it may not be obvious.* Clearly, you need to look for the reason—and then look again.

For the most part, I think that engineers believe in and live by the first part of the Law of Why, at least in their engineering work.



*Look for
the reason,
and then
look again.*

Causality is more than just a creed for engineers; it is a principle that underlies all that we do. The second part of the law, however, can sometimes be forgotten or ignored. This can happen in two ways.

First, in solving a problem that has cropped up (the process we call troubleshooting) the first thing we need to do is define the problem. The second is to look for the cause of the problem or the reason that it has occurred. Once that reason has been determined, we can then proceed to fix the

problem. But don’t jump to conclusions on that reason. The real reason, or the root cause, may not be obvious.

“The dining-room lights won’t work.”

“Aha! The circuit breaker is tripped. I’ll reset it”

“Okay, they work now.”

Never mind the lamp with the intermittent short circuit. Uh oh!

Another place where we sometimes ignore the second part of the law is in the design process. If the product fails, there will be a reason, but it may not be obvious—especially in the design phase. It is probably impossible to identify all of the variables that will affect the product that we are designing, but we need to do the best we can.

Some years ago—quite some years, actually—I found myself teaching a course in power systems. This is not exactly my field of expertise, but the students and I made the most of it, and we all learned a lot. Since I didn’t have

Lyle's Laws, continued

a great deal of experience in the field, I tended to give quite a few open-ended problems. One was to do the preliminary design for a transmission line to bring power to a village high in the Andes. I was proud of my students because, with a minimum of prompting, they recognized that altitude influences the corona effect, that jungles grow rapidly, and that the climate can influence the choice of transmission towers. One group even asked if we were sure that those people wanted electricity. They looked for the reasons that may not be obvious.

So never settle for *"That's just the way it is."* And never believe that the reason is always obvious.

Incidentally, when I learned a little more Spanish, I understood the reason for using *me* instead of *yo* in that language drill. When I said, *"Me gusta helado,"* I was not saying, *"I like ice cream."* I was saying, *"Ice cream pleases me,"* which explains the usage and carries the same meaning. How much more satisfied we would have been had the teacher given us that explanation. Why didn't he do it? I don't know. For everything there is a reason. But it may not be obvious.

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

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TAU BETA PI'S UPDATED 26-PAGE guide to planned-giving opportunities shows how your support can benefit both the Society and your financial situation. Topics include:

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SUN/VENUS RENDEZVOUS JUNE 8

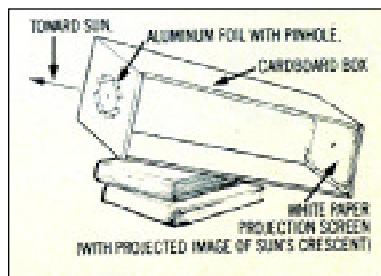
IN JUNE, ASTRONOMERS WILL FAN ACROSS Europe, the Middle East, Africa, and Asia and rise before dawn in the Eastern United States to watch an event no human now living has ever witnessed: the transit of Venus across the face of the Sun.

The event is likely to be no more visually striking than a small circular sunspot, possibly surrounded by a dusky ring of an atmosphere. But as in legend the beauty of the face of Helen of Troy launched a thousand ships, in history the transits of Venus launched two centuries of astronomers in expeditions questing after "the noblest problem in astronomy"—measuring the exact distance from Earth to the Sun.

The heartbreaking saga of 18th- and 19th-century adventurers who sacrificed years of their lives in this quest will be recounted in the Summer issue of THE BENT. Meanwhile, prepare for it by watching Venus transit the Sun for the first time in 120 years on Tuesday, June 8, 2004. Build a pinhole projector [see illustration] or fit a telescope with a solar filter, and plan to watch, *protecting the safety of your eyes* as you would for observing a solar eclipse. General information about the transits of Venus can be found at sunearth.gsfc.nasa.gov/eclipse/OH/transit04.html with "show times" for cities around the world at sunearth.gsfc.nasa.gov/eclipse/transit/TV2004.html#city; suggestions on techniques for safe viewing appear at www.eso.org/outreach/eduoff/edu-prog/vt-2004/safety.

Wake the children before dawn, and take a vacation day. This happened last in 1882; the next time will be in 2012. After that, your grandchildren and possibly even your great-grandchildren will be born, grow to adulthood, and pass away before Venus again blemishes the Sun, just before Christmas 2117.

Watch THE BENT for "Quest for the Astronomical Unit" by astronomical historian and writer Trudy E. Bell (who wrote "Taking Engineering by Storm," Winter 2004).



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