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Mathematics as Language

BY LYNDA LITTLE

WE MIGHT VERY WELL ASK, AS OUR students do, what is the point of learning a new language. The answer closest to hand, and that conferring the benediction of the useful, is, in order to communicate. Learn to speak French, and you will be able to communicate with that many more people. It works as well as any other starting point.

You will also be able to read French literature in French, which is where any advanced study of the language will take you. You will be able to partake of reasoning and insights never available to you as an English-only speaker. You will be able to recreate and enlarge yourself.

Of course, this argument is getting away from the merely useful. No one studies Latin, for instance, to communicate with Latin speakers, since there are none anymore. But many people still study Latin in order to read Latin authors, and so to partake of a form of thought unavailable anywhere else.

Perhaps, it could be argued, this is the real reward of learning another language. To become proficient in any language means to think anew. Each language is a different *via cogitandi*, a different means of approaching life and apprehending reality.

It makes sense to me to approach the teaching of mathematics as we would the teaching of any other language. So we begin by stressing the useful, without which assurance students can hardly be persuaded to undertake any new study. Thus, mathematics for everyday life, and, "This will help you to get hired, promoted, or earn more," or even the lame, "You need this to graduate." The legions of students who have an unreasoning, amorphous fear of mathematics might be able to see it as a more human and approachable thing if we spoke of it as another language. That wouldn't be a bad accomplishment, just that.

But the analogy goes farther. The first step in the acquiring of a new language is learning its basic units, i.e. words, vocabulary. In mathematics, we begin by acquiring the basic facts of addition and multiplication, and their opposites, subtraction and division. After that, we move to learning different kinds of numbers, as fractions, exponents, and radicals, which are analogous to different parts of speech. Awareness is formed of the various tasks that words and numbers may be called upon to perform.

Language students then advance to ways of synthesizing words, that is, syntax and grammar rules, enabling them to speak in simple, declarative sentences. Similarly, in acquiring mathematical language, students move to the rules governing order of operations and solving equations. They are now speaking, mathematically, in simple, declarative sentences. If students appreciated the similarity between basic mathematical facts and words, they would also appreciate the futility of trying to move on without them: it would be like trying to speak without words. Beyond the acquisition of basic grammar and syntax, language students will learn subtleties of different verb tense, mood and voice, so as to give voice to such complexities as aspirations, suppositions, conditions and reasoning.

Mathematically, after they have mastered the sentences of algebraic equations, students may move beyond numbers to performing operations on functions, to inductive reasoning and analytic geometry.

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Their mathematical language being now quite fluent, allows them access to realms of subtleties where real world correlatives do not always exist.

Even so much would be wonderful. But now let's take this analogy to the extreme and exhaust it.

Beyond subject matter, lie ideas. The flower of the study of any language is immersion in its literature. There is a point beyond mere fluency, at which one ceases translating the new language into the old, and begins to think in the new. To think as French, Swedish, or ancient Roman is to become receptive to new tools for apprehending reality. There is also a point at which mathematics ceases to be able to justify itself by mere usefulness, and practical applications become coincidental. Past this point, the student has ceased translating the mathematical language into his own, and has begun to think in it, breathing now a very pure, thin air of exhilaration.

Of course, not all students will get to these places either in mathematics or in language. What of them? One great advantage, as I see it, of treating mathematics as language is to demystify it. All students can learn language, as evidenced by their acquisition of at least one. They expect to be able to do it, if they put in the work. The expectation should be no different with mathematics: if they put in the work, they will acquire it.

We would also lose this disabling left brain/right brain dichotomy, which has become such an albatross around our necks. How many times have we had to endure, "I can't do math; I'm a right-brained person," as if brain style preferences had more to do with providential caprice than what we repeatedly do. What began as a useful tool for naming different ways of thinking has become an excuse not to try.

Rather, let us teach our students that it takes creativity to make connections in mathematics. What great mathematician was not creative? It also takes analytical ability to adhere to rules in language and thus use it as incisively as possible. What great writer flouted rules of grammar and syntax? To do anything well, both parts of the brain must be engaged. One is not more than, or complete without the other. We humans, students and teachers alike, are drawn to divisions and differences. But it is just as easy to focus on similarities, and much more productive. ■

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impression manager is loath to claim them—Angie's sensuality, for instance, or Buddy's self-righteous rage and brain lapses.

Buddy suffered a brain aneurysm when he was thirty-three on a Sunday afternoon right after the 49er game. Buddy's birthday was May 9, 1948, the day before mine. Severely anomic from his brain trauma, Buddy couldn't remember the names of people or things, so he filled in the gapping holes in his speech with "watchmacallit."

"I forgot to bring the watchmacallit," Buddy might say.

"What do you call it, Buddy?" I'd ask him, and he would sigh deeply to start the search of the scarred recesses of his brain for the location of the word he wanted.

"My b-b-bone, no . . umm . . b-boo- book." A faint smile would enliven his dark beard when the word clattered forth.

With his shoulder-length hair, biker-beard and bulging biceps, Buddy had a grisly look, concealing a wounded bear. He was an angry man. Angry because he'd lost a good paying job in San Francisco as a craftsman, a typesetter. Angry because his wife had left him, taking his two daughters with her. Angry because he was living in a dinky mobile home with his parents. Buddy punched walls in frustration, bruising and bloodying his knuckles, but not relieving his grief.

When Buddy couldn't express his needs to an admissions clerk, he took two right jabs at the cement balustrade by her window. When he struggled with a test question, he'd crumble each page of the test and hurl them at the chalkboard, slinging garbled epithets after them. To the surprise of my colleagues, I was not frightened by Buddy's anger. I would touch him lightly on the arm and tell him quietly that this behavior was not acceptable when he was at school. I appeared calm and in command because I knew Buddy wasn't dangerous; he was hurt and frustrated. I acted the same way, at home, out of sight, away from all eyes but my husband's. Only Raymond witnessed my fits of outrage—screaming, throwing, weeping, snotty rampages—usually directed at him, for in our dynamic, I elected to do the anger for both of us while he opted to subtly provoke me whenever we needed to let go of tension. In our story of collusion, we spent years perfecting this