Nutty about Writing

I just finished writing a book, and I'm thrilled about it. This is *Approximation Theory and Approximation Practice*, to be published by SIAM at the end of the year. I hope it's OK if I take this as an excuse to offer a rather personal column about the place of writing in my life.

FROM THE SIAM PRESIDENT
By Nick Trefethen

Writing was important to me even as a child, and I think there are two main reasons. One is that I attended a school that cared a lot about it (Shady Hill School in Cambridge, Massachusetts). The other is that my mother was a writer who truly loved the English language and encouraged me to feel the same way. One of her principles was that if you run into an unfamiliar word and wonder if it's worth the trouble to look it up in the dictionary, "it's always worth it!"

But there's no doubt that what cemented my relationship with English was a piece of equipment: the typewriter. When I was 9, my parents hauled a manual typewriter all the way around the world for a sabbatical in Australia, and a couple of years afterward I taught myself to touch-type from a book. (Later I bribed my own children with Gameboys to reach 30 words per minute.) Practicing typing meant practicing writing too. In my early teenage years I hammered away endlessly in my bedroom on a Smith-Corona electric and produced around a thousand pages of single-spaced diary entries. These pages are excruciating to read now, and I would sooner die than let you see any of them.

Having acquired a special skill, I used it in boarding school and college to make money—astonishingly little money. I typed my friends' term papers in the middle of the night for 35 cents a page, correcting their spelling and punctuation as part of the service.

Another sabbatical, seven years later, got the family hooked on a new machine, the IBM Selectric, a magical improvement over previous typewriters—it didn't even need a carriage-return lever! When I returned to Massachusetts at age 17, that became the first big purchase of my life: a Selectric II typewriter, paid for by a summer of lawnmowing at $1.50 per hour. It was big and heavy and white, and my roommates called it Moby Dick. I loved that machine and produced my undergraduate thesis on complex Chebyshev approximation on it, changing the Selectric "golf ball" every time a Greek letter was needed. I knew by heart which key to hit to get λ, ε, or δ from the Symbol ball. My roommates liked to make fun of "Chevy Chase approximation" (it was the era of Saturday Night Live), and here I am 35 years later, still writing about Chebyshev.

I had started typing ideas on index cards at age 14, shaping my less personal thoughts more carefully than for a diary, and soon the collection grew sizable. Many of you have seen a sample published last year as *Trefethen's Index Cards*. Writing these notes has been a lifelong habit and pleasure. Since they are short, every sentence gets carefully shaped and reshaped as I practice the art of combining substance and clarity. An outstanding freshman expository writing teacher at Harvard, Bill Dowling, strengthened my determination to make each word count. A typing contest with Bill Gates in sophomore year strengthened my conviction that the typists would inherit the earth. He had bragged at the lunch table of his prowess at the keyboard, but two witnesses saw me slaughter him half an hour later in a fair contest in his room in Currier House. Poor Bill with his index fingers never had a chance.

Graduate school brought another game-changing piece of technology, for I started as a PhD student in computer science at Stanford just as Don Knuth was inventing TeX. I liked this very much and wrote my first paper in the new system, an article on Schwarz–Christoffel mapping issued as a technical report by the Stanford CS department in March 1979. There is a chance that this is the first report anyone anywhere ever published in TeX! At least I haven't found an earlier one, not even by Knuth.

My generation of Californian graduate students were delighted to find that with TeX, complex formulas could be rendered perfectly. For people like me, the technology contributed to our perfectionism as writers. Even back then, Stanford had a laser printer (5 feet tall), and I got in the habit of printing out a page or two of mathematics, studying it carefully and improving it, printing again, improving again. These rounds of improvement took place with cups of coffee at Stanford's Tresidder student union. It is hard for me to imagine how I could have produced a thesis of careful mathematics without this loop of printing and polishing. Ever since, I iterate ten or twenty times for most pages of anything I write, a very happy process. Really there's nothing I like better than slipping off to a café with a fountain pen and a draft of some paper or book chapter that needs improving. The 28 chapters of *Approximation Theory and Approximation Practice* have been measured out in cappuccinos.

With time, my reliance on writing to formulate my thoughts has deepened. The idea for a proof may come offline, but within the hour, I'll be at the keyboard working to make the wording and the formulas precise. My students know that if they want to get through to me, they'd better write their ideas in a memo.

Recently, yet another tool has changed my habits. I had long depended on Matlab in my research, enabling me to explore numerical ideas in the style of "Ten Digit Algorithms." This way of researching wasn't particularly linked to writing, but then Matlab's Publish facility was introduced, analogous to worksheets in Maple or notebooks in Mathematica. These days I find I depend on Publish too as part of the thinking-and-writing loop. So now all the elements are combined: I have an idea, it requires computation, and I head for the keyboard. With Publish, the English and the mathematics and the numerics are coupled from the start.

So *Approximation Theory and Approximation Practice* will be an unusual book. Each of those 28 chapters originates in a Matlab M-file. When you

SIAM president Nick Trefethen (right) gave an invited talk ("How Chebfun Solves ODEs and Eigenvalue Problems") at the joint student conference in Manchester pictured in this issue. He is shown here with SIAM vice president-at-large Nick Higham of Manchester. Photo by Lijing Lin.

Publish the M-file, the comments turn into TeXed English and mathematics, and the commands turn into numbers and plots. Readers will be able to download the chapters and run each one themselves.

For me, writing and thinking are inseparable. Yet it is clear that not everybody is like me. Many mathematicians find writing a chore, and this doesn't keep them from producing outstanding results. The common view is that first you do the mathematics, and then you "write it up." What could be more natural? But that's not how it goes for those of us who are nutty about writing.