Personal Statement

My favorite party trick is explaining how the Fourier transform is just a rotation. Seriously. To be fair, I'm sure that no-one "understands" the Fourier transform as a result, but every time I've gotten similar comments: "That's fascinating. I had no idea math could be that interesting." Five to fifteen minutes to change someone's opinion about mathematics. You can just see their eyes open wide—like a kid in a candy shop. It's absolutely amazing. That excitement and enthusiasm is what makes me want to pursue a career in academia.

"Sure," you say. However, there's a deeper point to be made. Truth (the objective capital T kind) is often held up as the primary virtue in science, be it computational, mathematical, or otherwise. I disagree. Truth is only penultimate. Our ultimate goal is actually meaning and significance. Truth can't identify interesting work. Truth can't make students care. By itself, truth can't make a difference. If sound work is unimportant, it will languish in the archives, but if important work is unsound, it will be fixed, corrected, or rejected. I have tried to work in accord with this philosophy throughout my undergraduate years, to inspire those I have had the privilege to teach, and to draw together the communities to which I belong.

You don't just wake up one day and say, "I want to be a mathematician! I want to be a computer scientist!" More than for anyone else, it's important to motivate and excite beginners. With this goal in mind, I recently took a teaching assistant position, mentoring 6 math students in a freshmen introduction to research class. I meet with them once a week to offer advice and encouragement on their projects. Recently, I took them to the mathematics library, where I asked them to wrestle with the unfamiliar and abstract concepts lining the stacks. I was pleasantly surprised when a student wrote to me:

> "I've found some really cool applications for the Lebesgue integral...e.g integrating the Dirichlet function or the Dirac function ({x: +infinity if x = 0; 0 else} such that the the area is one....but no function really has this property but anyway its interesting stuff!"

I doubt that he understands the Lebesgue integral in a technical sense, but now I'm confident that he actually wants to understand it.

After presenting my honors thesis last Spring, I realized that most of my peers were completely unaware of each others' work. Looking to resolve this issue, I devised, planned and acquired funding for a one day computer science undergraduate mini-conference. Ten students gave short, 15-25 minute presentations on their work to an assembled audience of undergraduates and professors. For many present, this was their first conference-like experience, affording them insight into the structure and practice of academia. For underclassmen looking to begin research, this event provided a compact, accessible picture of research in the department. Most importantly, the presentations demonstrated the scope of actual undergraduate research, rather than the expansive agendas of professors and graduate students. More so than any other method I know, this imbues otherwise timid students with the confidence needed to pursue independent research projects. I am currently planning another conference for this December, and looking for younger students with which to co-organize. This way the conference will continue on after I leave the University of Texas.

I joined Turing Scholars (the computer science honors program) in 2004, in its third year of existence. Although the academic component of the program was mature, we had yet to develop a true sense of community. Concerned, I joined the student board. While on the board, I organ-

ized freshmen orientation and many other social activities throughout the year. However, I am most proud of my work improving the quality of our end of semester banquets. Before I joined the board these events were executed with little care or sense of purpose. I distinctly remember going to a chain restaurant, sitting in a booth with the four people I had arrived with, eating, and then leaving without having spoken hardly a single word to anyone else present. During my tenure on the board, I made sure that every banquet was hosted at a professor's house and prepared by students. I did so by personally organizing and spearheading the cooking and preparation for two years. This kind of banquet has many important effects. First, students cook and clean together, building community. Second, visiting a professor's house is more "special" and so more students attended. Last, and most importantly, the setting and effort expended by all involved created a sense of purpose. The director of the program was able to address the students, recognize achievements from the past semester, and individually honor graduating seniors. The banquets are now a hallmark event for the program.

When I turn to my research, I try to bring along this same sense of purpose. For me this often means working with pictures, shapes and geometry; mathematical and computational ideas that appeal directly to the senses. There's something very satisfying about asking "do you see what I mean?" in a completely literal sense. When I show my friends the latest research videos from computer graphics, (like the Cornell knitted cloth simulation from SIGGRAPH'08) they say "wow, that's cool." Among the many laudable motivations for scientific research, "that's cool" usually doesn't make the cut, but it should. In the end, that's why we're all doing research. At least, that's why I'm doing research. This isn't a utilitarian philosophy, but it doesn't have to be. When Victor Wooten belts out a killer bass solo, when Kurt Vonnegut writes "Poo-tee-weet?", when the lights rise after a Pixar film, we don't ask why. We just say wow.