George Pólya Awards

The George Pólya Awards, established in 1976, are made to authors of articles of expository excellence published in the *College Mathematics Journal*. The awards are named for George Pólya, who was a distinguished mathematician, well-known author, and professor at Stanford University.

William Q. Erickson

"Haste Makes Waste: An Optimization Problem," *The College Mathematics Journal*, 53:2, 122–133. doi.org/10.1080/07468342.2021.2022955

In "Haste Makes Waste: An Optimization Problem", William Erickson introduces his readers to fictional heroes Ivan and Olga who collaboratively tackle one of the most valuable optimization problems of the common era: How do we minimize our travel time during the morning commute to work? Being excellent mathematicians, Ivan and Olga use all the tools at their disposal: pens, napkins, *Mathematica*, and mediocre coffee. The morning analysis begins by assuming the speed of the traffic is a positive function of time and they focus their energy on determining when one should leave home in order to arrive at work in the minimal amount of time. Using some clever graphical analyses of inverse functions and accumulation functions, they produce an appealing visual interpretation of the underlying critical points and identify the absolute minimum through a numerical approximation. Not quite satisfied with the original simplifying assumption requiring the traffic to always have positive speed, Olga and Ivan next consider the case where traffic speed is allowed to be momentarily zero and, prompted by a quotation from Albert Einstein, conclude their morning of calculations by tackling the more realistic situations of traffic jams (zero speed on intervals of time). These arguments rely on visualizing limits of right and left Riemann sums, fortifying the thought process with more coffee, introducing an infimum function, and exploiting the usefulness of one-sided derivatives.

Both students and instructors will find Erickson's article a joy to read. Not only is it fun and very accessible to undergraduate students, but it is also surprisingly challenging as well. The article incorporates elements of mathematical modeling and demonstrates careful thought about elementary calculus, all the while employing a nice dose of geometric and covariational reasoning. It is a great example of real-world problem solving, challenging the reader with graphical interpretations of the model and providing thoughtful uses of inverse functions and the interpretation of definite integrals.

As with any interesting mathematical presentation, Erickson leaves the reader with more questions than they started with. "Haste Makes Waste"

provides a great starting point to involve undergraduates in mathematical exploration and discovery.

Response

I am deeply honored to receive this award, especially because of my admiration for its namesake, the great George Pólya. I had hoped that my article would offer students yet another example of Pólya's central message: "Your problem may be modest, but if it challenges your curiosity and brings into play your inventive faculties, and if you solve it by your own means, you may experience the tension and enjoy the triumph of discovery." This little traffic problem did in fact occur to me while driving through morning rush hour on the way to calculus class; at first, I intended it as a five-minute warmup for my students, but soon realized it was more involved than expected. The solving and the writing were pure fun (thanks in part to the real-life Olga, whose personality heavily inspired the heroine of the article), and I wish that same joy to teachers and students thinking about the problem. Sincerely grateful to the MAA and the *College Mathematics Journal* for this honor, I would also like to thank my advisor, Jeb Willenbring, who encouraged these side projects during graduate school, along with the anonymous referee for the thoughtful suggestions on the first draft.

Biographical Sketch

William Erickson is a postdoctoral research fellow at Baylor University. After eight years happily teaching middle- and high-school math and Latin, he earned his doctorate from the University of Wisconsin-Milwaukee in 2022, under the supervision of Jeb Willenbring. His research interests lie in representation theory, combinatorics, and algebraic statistics.