Radu's Rides: **Beauty and The Feast**

Radu V. Craiu writes:

One of my oldest friends is an architect and she knows a lot about beauty. When I first met her a few decades ago, she was in possession of a well-tuned aesthetics barometer. She would look at an outfit, a house, or a boat, and classify them without any hesitation as beautiful, ugly, or meh. At first I was fascinated by it, soon thereafter annoyed, and much later, jealous. As an aspiring mathematician, I believed that all worthy causes, including beauty, could be explained logically and was therefore irked by the lack of an explanation. It was impossible to extract from my friend a clear proof that something is ugly or beautiful. Things were made trickier by the fact that I found some of the ugly things to be meh and some of the beautiful things to be head-scratching. This did not help our friendship or my understanding of aesthetic principles, but it provided a silver lining: I started to pay more attention to what people call beautiful or ugly.

For one, I paid more attention to mathematicians' opinions on the matter. They also impressed me with their very strong convictions about what makes a theory or a proof beautiful. I had my own thoughts on this, and they favoured surprising connections, short formulas and coherent build-ups. Symmetry and geometrical intuition were my favourite colours. When I think back on my undergraduate years, the Cauchy residue theorem in complex analysis stands out—its succinct formulation, its ability to connect geometry and analysis, and its practical usefulness struck a chord. But not all good mathematical "looks" are equally easy to recognize. I have often heard this or that result called poetic or gorgeous but, just like with all those villas from my architectural past, I was sometimes left confused, riddled with more questions than reverence.

An encounter with statistics makes these matters more interesting, partly because the mathematics is allowed to bow out so that other types of intuitions and intellectual constructions can stimulate our senses. Randomness and life are inextricably linked, so an idea that tames the former can look very pretty if it improves the latter. The beauty of a statistical idea, concept, or method cannot be completely disentangled from its practical impact. If mathematical ideas must have beauty and brains, statistical ones must have beauty, brains and the know-how to fix the kitchen sink.

Sometimes, the beauty of a method takes time to penetrate the collective psyche, with a gradual accumulation of applications and equally good-looking offspring. There is a certain penchant in our discipline for greatly admiring a coherent theory or a method that threatens to solve a wide swath of problems. Perhaps we are a bit less generous with our appreciation of an imaginative analysis which is artfully concocted to extract the maximum amount of information—relative to a particular set of questions—from a particular dataset.

Yet nowhere have I felt more like the confused bystander I once was next to my architect friend than in the presence of a strong applied statistician. This time the frustration is bigger because *I am supposed to know this stuff.* Why is this dot away from the curve a problem when these other two aren't? Why can I trust the interpolating curve in this model but not in the other one? In time I learned, like many of the *Bulletin*'s readers, that a strong statistical analysis is *meta* (your Gen Z student would call it multi-hyphenate) in the best interpretation of that word. It incorporates technical abilities, subject matter knowledge, and that lovely secret ingredient which is made of intuition, some leap of faith, and the courage to step away from the beaten path. Of course, there are explanations of why an analysis is incorrect or ugly, but these go *up to a point.* The remaining part of the argument relies on experience and those statistical senses and intuitions which we nurture in our training. No wonder the best applied statisticians I know are hard to imitate; asked why they made a particular choice, they smile and shrug, much as my friend did when I asked her about my outfit.

Like some of my colleagues, I feel, on the days when I wear my theoretical hat, like the last horse rider in Detroit watching the Model Ts pour out of the Ford factory. On other days, while still humbled by the machines' ability to combine concepts and ideas that humans have toiled for hundreds of years to discover, I am comforted in my belief that proving theorems is not the be-all and end-all goal of a data scientist. Information transfer and interpretation of a method's performance remain, for now, an area where our horse still gallops.

Perhaps I find most solace in the thought that beauty is a civilizational aim and the human ability to create it will continue to keep us relevant. Machines can be taught to count, even to compose, but deciding what deserves to be called beautiful, and why it matters, remains a human argument. One that my architect friend and I will be having for decades.