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CHAIRPERSON'S CORNER

FSA=mc²?

By Dave Snell

This year, I was honored to be a keynote speaker at the Actuarial Research Conference (ARC). It was held in Winnipeg at the University of Manitoba. For me, it was both a humbling and a gratifying experience.

I say humbling because within the first hour I realized I was probably the least formally educated speaker. Most of the others had both FSA and Ph.D. designations and their sessions had titles that I did not understand … and those were just the titles! Years ago, I felt pretty confident about calculus and other so-called 'higher mathematics' subjects. I was the lone engineering major in my class who insisted on taking the theoretical track for math majors in addition to the applied mathematics track for engineers. In our theoretical classes, untainted by applications, we once spent two weeks of class time proving the existence of a solution to a certain type of partial differential equation. At the end of the two weeks, we had no clue how to solve it, but we proved conclusively that a solution existed. In the engineering math classes we would have calculated a solution within 20 minutes—whether or not it existed! There is a value to both perspectives, but they sometimes are not in harmony.

Getting back to the ARC, I was quickly intimidated by the plethora of PowerPoint slides that were covered with integrals, transform symbols and Greek characters. Many of these presentations looked like they were ideal for the *North American Actuarial Journal* (NAAJ). I really look forward to the *NAAJ*. When a new issue arrives, I eagerly look through it in hopes of finding an article I can understand. When I do, I feel elated. Sometimes I do not get to feel elated. Still, I can leave it conspicuously on my desk and then programmers or underwriters who stop by often infer that I am smarter than I really am. It's a great publication.

The feelings of gratification came later during the conference, when several attendees came up at various times to thank me for a presentation they could understand and enjoy. In fact, one attendee suggested to me afterward that I should rename the presentation "Simplicity" because she was originally having misgivings about attending a lecture on a complicated topic, but she came away feeling like she understood me. Many were truly excited about going back and delving into genetic algorithms, or other complexity (simplicity?) topics. I enjoy sharing my enthusiasm for the new set of tools and techniques that we now have available to actuaries, and I am impressed by the bright young minds that take my simple ideas and extend them to very useful applications.

My point here is that actuaries sometimes tend to be highly technical. We need that orientation to do breakthrough research. We also want to make sure that our models and conclusions are based on rigorous application of theory. After all, they must model the complex risk analysis problems that our public depends on us to analyze for them.

In addition to this attention to technical details we need to be able to communicate our ideas in a manner understandable by the less technically oriented population who want the benefit of our expertise. Let's look at a simple example from Einstein: When you can take a subject as complicated as relativity theory, and pare all the daunting Lorentz transformations and the dozens of supporting equations down to something as concise and understandable as $E = mc^2$, you are hailed as the greatest scientific brain of the century.

The public does not need an advanced degree in physics to get the idea that a small amount of mass can be the source of a huge amount of energy. In fact, a single gram of mass contains the energy equivalent of burning 568,000 gallons of gasoline *(http://en.wikipedia.org/wiki/Mass%E2%80%93energy_equivalence)* but even folks who do not do the conversions can understand the basic idea—that when you convert mass to energy you multiply it by a very big number. Einstein was not the great technical wizard who claimed to understand quantum physics, and several scientists prior to him proposed that there was a relationship between mass and energy. Part of his genius, though, was the ability to summarize it—to make it understandable.

At ARC, I had the pleasure of chatting with Mary Hardy, who has a daunting list of credentials: FSA, CERA, FIA, Ph.D. She is the editor of the *NAAJ* so you can be fairly confident that she is comfortable with mathematics that I would find incomprehensible. Yet, she shared that one of the papers for which she was most proud was one that did not get a very impressive reception from the academic community. She said it was not deemed rigorous or technical enough for them. It was the introduction of a measure of risk she and her co-author, Julia Viinikka, called the CTE, or Conditional Tail Expectation. The CTE is now widely used throughout North America as a major standard of risk measurement. Most of you have used or at least read about CTEs. I even talk about it in my introduction to complexity sciences. It's a simple way of expressing risk. The mathematics behind it is complicated for non-mathematicians, but the result is understandable by actuaries and by management.

AOF is the section that has an enormous influx of younger, brighter actuaries who are very competent technically. Some of you can juggle the calculus, the Greeks, and the matrix algebra, and perhaps even chew gum and solve Sudoku puzzles at the same time. I urge you to also learn to communicate your results to less technically astute populations. Wouldn't it be great if the next breakthrough idea in the media happened to be from an actuary?

Consider becoming the rock star of risk. $FSA=mc^2$! ☆

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