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FROM THE EDITOR:

Forecasting & Futurism– "One of the Best Kept Secrets of the SOA"

By Dave Snell

A few days prior to starting this issue's introduction, I was in Chicago at a Society of Actuaries Cultivate Opportunities Team meeting, and heard an SOA Board member describe the Forecasting & Futurism section as "one of the best kept secrets of the SOA." It was meant mostly as a compliment; but also as a regret regarding our section name. The SOA has formed a major initiative to promote actuaries as the logical choice when any industry wants professionals to do predictive modeling (PM). Yet, most SOA members have no idea what our Forecasting & Futurism section does, and they are quite surprised to learn that we have been presenting sessions on, and publishing articles on, PM and related topics continually for at least the last six years. I'm even told that some SOA members assume we just sit around with tinfoil hats and talk about science fiction. Last year, the confusion increased a bit when the Modeling section was formed. Another member of the cultivate opportunities team, who heads up a PM department at a major insurer, said she joined the modeling section thinking it was where she would interact with the other predictive modelers. Then she discovered it was not for PM, but focused more on usage and controls for traditional actuarial models—and she had no idea the Forecasting & Futurism section had the PM focus she wanted!

Clearly, we have a perception issue. We are the section most interested in predictive modeling and predictive analytics, but also the section that recognizes the complexity of forecasting includes not just analytic models but also behavioral economics and other non-quantitative approaches to predictions that complement the strictly numbers approaches. It is difficult to convey our broad range of prediction techniques in a concise name, and thus, we sometimes suffer the tinfoil hat appellation due to faulty perceptions. Ironically, we are also the section that has published and presented the most on Behavioral Economics, which shows how perceptions can be so much more persuasive than facts. One of the sessions we scheduled for the Health meeting this year was *Predictive Analytics – The Reason Your Strictly Analytic Models Fail!*

Over and over we encounter situations where a mathematically sophisticated actuarial model will fail because it relies strictly on logic, and people just refuse to obey the rules of logic.

This issue includes some fascinating articles on behavioral economics. You can start with the chairperson's article from Doug Norris: "Can't Win for Losing." Doug tells us about the "Winner's Curse"—a phenomenon in which the winner of an auction, or the company with the lowest bid on a contract, may turn out to be more of a loser than a true winner. One interesting observation he makes is that "the greater the number of participants in the auction, the more likely it is that the ultimate winner has overvalued the item." Doug reminds us that knowledge is the best defense when we are developing rates, and he offers good advice on checks to make so that we do not suffer the winner's curse in our quest for a win.

Ben Wolzenski continues the behavioral economics lessons with his poignant review of *"Why Smart People Make Big Money Mistakes and How to Correct Them: Lessons from the New Science of Behavioral Economics."* Ben gives a

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walkthrough of some of the chapters in this book by Gary Belsky and Thomas Gilovich, and summarizes some non-intuitive maxims such as "Not All Dollars Are Created Equal"—why casinos use house money so we will gamble more, "Herd it Through the Grapevine"—how investors follow the herd when it is too late, and "Dropping Anchor"—a stated number or name may have zero relevance to a situation; but it can bias our actions in that situation.

Tyson Mohr contributes another behavioral economics book review. He tells us about *Thinking, Fast & Slow,* by Daniel Kahneman. If you don't have the time to read the 500+ page book, read Tyson's review of it for an excellent summary in far fewer pages. The examples he draws from the book include such gems as "repeated statements become increasingly more believable and likeable" or as we might say "repeated statements become increasingly more believable and likeable." The mere exposure effect is difficult to understand; but it works. It really does. It often does work.

Does this mean there is no place for the quantitative techniques that actuaries know and love when it comes to judgement and forecasting? No! Fortunately, Mary Pat Campbell reassures us that they can be used to improve decisions over those made by purely qualitative methods and over those made simply by the so-called wisdom of crowds. In "What I've Learned from the Good Judgement Project," Mary Pat describes a new type of group prediction method. In this twist on crowd wisdom, the participants and their contributions are tracked, and the better predictors are accorded higher than average weightings for future group predictions. According to Mary Pat, this is a government funded project under a department with a surprising name: the Office of Anticipating Surprise. Read about the project, and Mary Pat's experience with it in her enlightening article.

Getting back to numbers, we also have a lot in this issue on various forms of predictive analytics. Brian Holland wrote an article on how we can deal with the real world problem of how to apply predictive models when your data is missing several values, or values are based on limited exposure. He writes about how to apply singular value decomposition (SVD) in these situations in his article "SVD of Weighted or Missing Data." In the first draft of Brian's article, he used the acronym WMD in the title, and my first impression was that these types of data gaps are weapons of mass destruction for the accuracy of our models. Brian arms us for battle with references to several academic tools and to an R programming package that helps us avoid the danger of overfitting our sometimes sparse data.

Shea Parkes and Brad Armstrong continue this line of discussion with an article that introduces us to a technique known as ridge regression. Ridge regression, as they show with an applied example, is especially useful when you have parameters and coefficients for a large population, with high credibility for that population; but you wish to adjust the coefficients that will be credibly different for a smaller, target population. Shea and Brad use a penalized regression and cross validation approach to choose a reasonable balance between standard weights from the larger population and completely retrained weights from the target population. Read their article, "Calibrating Risk Score Model with Partial Credibility" for the details and see how this approach can help you recalibrate your predictive analytics model for a moderate size, but not fully credible, target population.

Admittedly, Brian, Brad and Shea have contributed approaches for more experienced PM actuaries. What do we have in this issue for the actuary starting out with PM? Lots! Next in this issue we present an article with an unusual title: "Appendix B: How to Build a Model." This actually is a copy of an appendix of a research paper sponsored by the SOA Committee on Finance Research. You can read the entire research paper: "Lapse Modeling for the Post-Level Period—a Practical Application of Predictive Modeling" at the SOA site *https://www.soa.org/Research/Research-Projects/Finance-Investment/lapse-2015-modeling-post-level/#sthash.W9lERSls.dpbs,* but you can read this valuable appendix copied here in this issue to see how to build a PM step-by-step using your data and the R programming language. We thank Richard Xu, Dihui Lai, Minyu Cao, Scott Rushing, and Tim Rozar for their excellent paper and the Society of Actuaries, for the permission to reprint this portion of the paper.

Again, for the reader seeking a way to get started in the forecasting field, we have an article from Doug Norris, titled "Simple Rating Systems: Entry-Level Sports Forecasting." Doug is an avid sports fan. He would sometimes apologize for background noise on F&F council calls when he was still at the hockey rink. Although he sports a Ph.D. in mathematics, in this article Doug walks the reader from a very basic sports prediction algorithm: "when an undefeated team plays a winless team, the undefeated team usually wins" and gradually layers on levels of increasing sophistication without resorting to calculus, advanced statistics, or any Greek letters. This one, you can read without having to drag out study notes or your old textbooks. It's a winner!

Still, some of us like to make that leap to more advanced PM, but without the angst and wheel spinning often associated with self-study. Bryon Robidoux summarizes his experience at the Predictive Analytics World (PAW) conference this spring in San Francisco. Bryon's article, "Stepping Out," is one actuary's perspective on the value of a conference that might not be covered by your company; but still might be a prudent investment in your future if you wish to enter the PM field. Bryon describes a hands-on introductory class on using R for predictive modeling, summarizes keynote speeches from PM experts, and lists the PAW conference recommendations on how to prepare yourself for a PM position. One surprising item on the recommendation list was YouTube instructional videos. Another topic of interest was the one on the qualities of a good data scientist, which Bryon notes as very similar to those for a good actuary.

Speaking of Data Scientists, our non-actuary Data Scientist Friend of the F&F Council, Jeff Heaton, contributed his article "What Big Data is, and How to Deal with It." Jeff is a prolific writer for F&F and he is the author of several books on PM and related topics. His current series, *Artificial Intelligence for Humans* will see Volume 3 published later this year. Search on Amazon for "neural networks" and one or more of Jeff's books is likely to top the result list. In this article, Jeff describes the history and in some respects, the future of Big Data, and the tools we can use to handle it for PM and for machine learning. One such tool is Vowpal Wabbit, which sounds like something from a Bugs Bunny and Elmer Fudd cartoon ("Dwat that wabbit"), but it really is a popular approach to process a dataset of any size, as there is no need to load all the data into memory.

Big data is forcing us to enhance many of our tools. So is the increased actuarial usage of stochastic-in-stochastic analyses (nested stochastic processes), which can result in unacceptably long program run times. Many of our popular computer languages are not inherently well suited for parallel computations. This creates a bottleneck in an age where hardware costs have decreased dramatically and multiple machines may be cost effective but the software can't take advantage of them. Charles Tsai writes about a free and open source language solution from MIT named Julia. His article, "A 'Hot Date' with Julia: Parallel Computations of Stochastic Valuations," introduces us to Julia, and shows a four CPU example that runs significantly faster than the traditional non-parallel approach used by R and many other languages. In his discussion of whether Julia is a disruptive innovation, Charles gives an unbiased summary of both advantages and weaknesses of Julia for actuaries. His writing style takes a topic with the potential to be tedious and he makes it fast-paced and interesting. Whether you are ultimately interested in Julia or not, his discussion of the advantages of parallel processing is worthwhile to read.

I'm ending this issue with a summary article that is probably long overdue. We get a steadily increasing number of queries from actuaries asking how to get started with predictive modeling, behavioral economics, Delphi studies, genetic algorithms, machine learning, complexity sciences, classification and regression, etc. and over the past six years, the F&F

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section newsletter has published more than 100 articles that touch upon these and other topics. Our last article for this issue is a list I've compiled of all these articles, the authors you might wish to contact for more information, and a very brief description of the article. I hope you find it helpful.

I mentioned the allusion to tinfoil hats already and repeating that phrase that is probably risky because, as we know from behavioral economics, "repeated statements become increasingly more believable"; but there is a part of F&F where we can proudly display the tinfoil hats: as part of our interest in Futurism we are cosponsors of the annual Actuarial Speculative Fiction contest. I have had the honor to be one of the judges for several years now and I personally look forward to each year's new collection of actuarially-related short stories of what the future may hold for us. You can read all 16 stories, including the overall winner (*Life After Death* by Ken Feng) and the F&F section winner (*Hotel Zukunft: The Future is Different* by Craig DeAlmeida) at the SOA website page *https://www.soa.org/Professional-Interests/2015-speculative-fiction-contest-final.aspx#sthash.h2Yhrlr3.dpbs* and I recommend them as thought provoking and enjoyable reads. In April of this year, Vanessa Drucker wrote an article about this contest in the *Retirement Income Journal* (Vol.301, April 23, 2015) titled, "Who Knew? Actuaries Have Two-Sided Brains."

As you can see from this introduction, the current issue is loaded with salient articles on predictive modeling, behavioral economics, big data, and new forecasting tools such as hot new programming languages. Read and share these ideas with your colleagues. We may currently be one of the best kept secrets in the SOA; but you have our permission and encouragement to share the secret. Hey, have you heard how cool the F&F section is? It's kind of a secret, but please pass it on! ▼

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