INTERVIEWS

JEFF ROSENTHAL

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Jeffrey Rosenthal is Professor of Statistics at the University of Toronto, Canada. He received his Masters and Ph.D. at Harvard working with Persi Diaconis on seminal contributions to the convergence theory of Markov chains. Prior to joining the University of Toronto, Jeff started his career at the University of Minnesota. His research focuses on the theory of Markov chain Monte Carlo, probability, statistical computation and stochastic process. Jeff is a fellow of the Institute for Mathematical Statistics and has received several national and international awards. Among his recognitions we cite the Premier's Research Excellence Award and the COPSS President's Award. Jeff's CV currently lists more than 80 technical papers.

I had the pleasure of meeting Jeff at MCMSki 2011 and he graciously agreed to answer some of our questions.

1. *Bayesian, as well as non-Bayesian practitioners often learn and use MCMC techniques in the form of simple algorithms and get along with their lives without too much emphasis on the theory of Markov chains. Such practitioners might be tempted to ask, what is Theory good for?*

Hello Donatello, thanks for interviewing me!

Certainly the biggest impact of MCMC has come from the wide variety of successful applications. However, theory still has an important role to play. Basic theoretical concepts such as irreducibility, stationarity, laws of large numbers, and so on, underlie virtually all uses of MCMC. In addition, more sophisticated theoretical notions such as quantitative and qualitative convergence rates (e.g. geometric ergodicity), and central limit theorems, and optimal proposal covariance (obtained from diffusion limits), can offer great insights into how to improve and tune and understand the MCMC algorithms when they are run.

In addition, many advances in MCMC techniques, such as tempering, hybrid chains, transdimensional chains, and now adaptive MCMC, all would not have been possible without a deep understanding of the theory to determine which algorithm extensions are valid and which are not.

I don't suggest that applied MCMC users should all become theorists – on the contrary, they should keep the applications coming. But we should all be aware that theory has also been an important part of MCMC development and has a lot to teach us too, including useful advice and guidance for MCMC practitioners.

2. *Often adaptive techniques are left out of the basic MCMC curriculum and even standard textbooks sometimes dismiss the topic with few excuses. Are there concepts, you think should absolutely make it into our classrooms?*

Well, adaptive MCMC is still fairly new, but it seems very promising and exciting, and I predict that it will be more and more important in the years ahead. I do think that everyone should at least understand how it has the potential to improve MCMC so much, but how it can fail if certain conditions are violated. Indeed, I think it's fair to say that theory has been central to the development of adaptive MCMC, and practitioners avoid it at their peril.

More generally, I think every MCMC user should have some basic understanding of Markov chain theory, convergence rates, error bounds, optimal scaling, central limit theorems, and so on, regardless of their particular area of emphasis. Of course, such theory will not solve all of the challenges that arise in applied work, but it is still an important and useful part of the field.

3. *The last MCMSki meeting included a panel on the challenges associated with MCMC-driven inference and high dimensional problems. Do you think the increasing trend in the consideration of data-intensive problems will eventually lead to the abandonment of these techniques?*

High dimensional problems certainly present lots of challenges for MCMC. But they present challenges for all other methods too! I think MCMC is so versatile and powerful that it will be around for many years to come – though we should also maintain the flexibility to use other

methods when appropriate, rather than automatically assume that MCMC is the answer to every problem.

4. *Your book "Struck by Lightning: The Curious World of Probabilities" is among the best selling non-fictional books in Canada. Did you have to do things like book signings or have to keep obsessed fans at bay?*

Actually, yes! My book was much more popular than expected, and as a result I ended up doing a very large number of media interviews, public talks, book signings, etc. (see www.probability.ca/sbl). It was a very interesting experience, meeting lots of different people and getting invited to speak to all sorts of groups that otherwise would never have even heard of me. And I still get e-mails from readers and viewers asking me various probability questions, ranging from the interesting to the mundane to the bizarre. This has given me a whole new perspective about how statistics and probability are viewed "out there" by the general public with no academic training in these areas. Not to mention a peek at the inner workings of such unusual worlds as television and news media, the publishing business, speakers bureaus, documentary makers, and so on. It's been quite a ride!

5. Looking at your web page (fun section) I see fun things ranging from drawing to social dancing. My favorite is improvisational comedy, so I will put you to the test: any comedic acronyms we can assign to ISBA?

Hm, let's see. Perhaps "I See Big Apes"? Or "Infinity Seems Big, Actually". Or "Instant Satisfaction, Before Analysis!" Or a strange question, like "Isn't Seven Before Ate?"

But actually, improvisational comedy isn't so much about clever word play, as it is about learning to "go with the moment" and make an interesting scene out of whatever audience suggestion or performer's line happens to arise. In that sense, it has useful lessons for real life too: when unexpected events arise, we can either worry and complain about them, or accept them and go with the flow, and improvisers are trained to do the latter (as best as we can). Anyway, performing improv is a lot of fun, at least when it goes well and generates lots of spontaneous laughs and entertainment.

In addition to improv, I have also done a fair bit of musical performing. This has included sometimes participating in the musical "cabarets" at the closing banquets of some of the Bayesian meetings, so some of your readers might have seen me perform there. If so, then I hope they will forgive me for whatever suffering I have caused!

Thanks to Jeff, for the kindly answering our questions.

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STUDENTS' CORNER

Q & A

Luke Bornn
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In this issue's Students' Corner, we continue our Q & A with a panel of leading Bayesian statisticians. If you have a question for the panel for future issues, please email me. Following the Q & A, find the dissertation abstract of Andrea Riebler, entitled "Multivariate Age-Period-Cohort Models." If you are newly graduated and would like to publish your thesis abstract, don't hesitate to contact me.

"WHO IS THE STATISTICIAN OR SCIENTIST YOU ADMIRE THE MOST? WHY?"

Dani Gamerman
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This is certainly a very tough question as there are many scientists that have changed the way the world is and the way we think about it. There is no way to avoid admiring people like Galilei, Newton, Gauss, Einstein, Freud for their immense contribution to Science and mankind.

I think that Statistics' preeminence in Science is some orders of magnitude smaller than other