A conversation with Professor Xiao-Li Meng

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Abstract. Xiao-Li Meng was born on January 24, 1963, in Shanghai, China. After obtaining his undergraduate degree from Fudan University in Shanghai, he taught mathematics at China Textile University for two years, before returning to Fudan for his master study in mathematical statistics. He joined Harvard University in 1986, where he obtained a PhD in Statistics in 1990, working with Don Rubin on the EM algorithm and multiple imputation and with Professor Shaw-Hua Lo on survival analyses and asymptotics. Professor Meng was on the faculty of the University of Chicago for ten years, and in the year 2001 he returned to Harvard, where he is now the chairman of the Statistics Department. Professor Meng is the 2001 COPSS winner, recipient of the 2003 ICSA Distinguish Achievement Award, fellow of ASA and IMS, Co-editor of *Statistica Sinica*, member of numerous editorial boards, and is currently nominated for 2007-2009 vice-president of the American Statistical Association. He has over 70 publications, and continues to spread his passion for statistics wherever he goes.

Xiao-Li Meng, Speaking at Art Dempster's Retirement Party, May 20, 2005.

Introduction

How best to introduce Prof. Meng? When I was asked to conduct this interview the first thing that came to mind was "how many pages do we have?" It turned out, fortunately, that the answer was "as many as we wished to fill." Although I cannot really say that I accomplished that goal – as there are many more stories about Prof. Meng that would have to wait for another occasion and even more space -- I can only hope that the space filled can give you a glimpse of Prof. Meng's professional achievements, as well as his extraordinarily generous and well-loved personal side. It is a collection of conversations and interviews, held with friends over many dinners and bottles of wine, and a few of the stories which colleagues of Prof. Meng have shared with us.

A Professor of Words and Numbers

VMD: Not only are you one of the most highly cited researchers in the mathematical sciences (you were ranked among top 25 by the Science Watch among all articles published and cited between 1991 and 2000), but you also have quite a number of memorable funny quotes attributed to you. I remember you at one of the ENAR meetings shortly after becoming the chair at Harvard, responding to people that "a great perk for being a chair is that I now can do *search* whenever I cannot do *research*". Or, "It's all missing data to me!" (Prof. Meng has also been caught saying on occasion to his students and post-docs that "Latex is good for soul", but somehow that did not catch on as much.) Similarly, many of your papers do not seem to have a "normal" title – there is always a pun, some word game, a funny analogy: "Missing Data: Dial M for ???", "The EM Algorithm: An Old Folk Song Sung to a Fast New Tune", or "Meeting Hausdorff in Monte Carlo: A Surprising Tour with Antihype Fractals". Your fondness for words is remarkable – in fact, you have an unusual affinity for both numbers and for words. Can you tell us more about that?

XLM: *Yes, in China during the Cultural Revolution, almost all parents wanted their children to learn a certain skill, such as painting or calligraphy for example. It was a way to avoid being sent to the countryside after finishing middle or high schools (universities were shut down during the Cultural Revolution). I spent most of my time doing calligraphy, and was very interested in poetry and literature in general. But I was also always very interested in mathematics – in fact, it turned out that I was lucky to have a couple of very good middle-school teachers in mathematics who instilled the love for it in me. So poetry, literature, and math have always played a great part in my life.*

VMD: Were your parents supportive?

XLM: *Both my parents were school teachers, so they were naturally very supportive of my study. In particular, my mother, like many Chinese parents then (or even now), was very strict, especially when it came to matters of education. She had a number of ways to punish me if I did not do my best in school. Well, I will not give any details here as I don't think any of these methods is acceptable in this country. But I have to say that they worked well on me, and as I grow older I am becoming more appreciative of my mother's effort and intention …*

From calligraphy to math to stats

VMD: So when did you realize that you are very good at math?

XLM: *It was when the Cultural Revolution ended and the whole country had a "math fever" because of a glorifying newspaper article on how a Chinese mathematician, Jing-Run Chen, obtained the closest result*

to the "Goldbach Conjecture"[2], which, as far as I am aware, is still open. Ironically, Chen's achievement was partially due to the Cultural Revolution because he couldn't do anything else but to bury himself, literally, in layers of scratch papers for years. So there were plenty of intriguing math-competition type of problems around, and somehow I gained a reputation, in my middle school, as being the one who could solve all the problems. Of course, no one could solve all the problems, but I was able to solve a bit more than my classmates. I was then sent to try a pre-test for taking the national college entry exam – I had to take the pre-test because the entry exam required a formal high school education, which I did not have. The pre-test consisted of only math and literature, which was particularly good for me because both were my strong subjects. I ended up ranking number two on either test but number one in the combined score in my county, gaining the permission to take the national college entry examination – or I should say the entry point of my professional career.

VMD: Then after getting your theoretical mathematics degree from Fudan, you got a job at China Textile University in Shanghai teaching mathematics. What was the path that led you into statistics?

XLM: *Yes, I taught for a couple of years there, before being given an opportunity to go back to Fudan for a master program in mathematical statistics. I took every course in probability and stochastic processes I could at Fudan – they were very theoretical, but they had many courses in that field. They fascinated me.*

VMD: What was the reason that made you transition from mathematics to statistics?

XLM: *After taking all seven courses in stochastic processes, I was really fascinated by the idea that one can use <u>precise</u> mathematics to describe <u>random</u> phenomena occurring in real world. This fact still fascinates me, and likely will for the rest of my life. So studying statistics became my destination.*

The Harvard Years

VMD: So after finishing your master study at Fudan in 1986, you applied to Harvard for your doctorate. How did you choose Harvard?

XLM: *Actually, I took an advice of a classmate, who just got into Purdue Statistics, that I should apply to some big, some small, and some medium schools. So I chose Harvard as one of the big ones, and everyone laughed at me... I was one of the very few (then) Chinese students to even apply there. I also applied to Berkeley, Purdue, Wisconsin, Ohio State, Pittsburgh and Bowling Green State. I was admitted to all of them except for Berkeley, which still has not sent me their decision ... (Laughter.)*

VMD: You wrote an interesting application, right?

XLM: *Yes, I chose Empirical Bayes as the central theme for my personal statement. Wait – it just occurred to me that might be the reason that my application was tossed out by the Big B! (Laughter.) It had a bit of the tone of "Mao's wisdom." In those days we typically started a paper or chapter with a quotation from Mao, and then built it somehow into the paper. It was said and believed then in some*

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[2] The original Goldbach's conjecture was first written in his 1742 letter to Euler, stating that "at least it seems that every number that is greater than 2 is the sum of three primes." Euler then proposed an equivalent form (now commonly referred to as the Goldbach conjecture) stating that "all positive even integers greater than 3 can be expressed as the sum of two prime numbers." Chen in 1978 showed that all sufficiently large even numbers are the sum of a prime and the product of at most two primes, the so-called "1+2" result, just srop short for the conjectured "1+1" result.

Chinese statistical circles that Bayesian statistics was banned then because of a quotation due to Mao implying that prior knowledge can never be trusted. I therefore discussed in my statement that the fact that Empirical Bayes uses data to estimate the prior may make it easier to be allowed in China. But I have to confess that I really did not know much about empirical Bayes then, and I still do not fully understand it now! Nevertheless, Don Rubin later told me that I was admitted partially because of that statement, for Don said that it was somewhat unexpected that I did not brag about my mathematical ability, as mathematical applicants often do, but rather tried to make some sense out of a statistical concept.

VMD: How were your years at Harvard?

XLM: *When I first came to Harvard, I thought I knew much about statistics, after having taken so many math and stochastic processes classes... Soon I'd learn how naïve I was! For my first year, I followed the common wisdom to take some hard and some easy courses to "balance things out". The only problem was that I got completely wrong what's easy and what's hard! For example, I thought applied regression would be just about taking derivatives and finding least squares estimates, which I have done many times before. But... they started looking at residuals, then transforming variables, even on both sides, then fiddling with the residuals again, and then making more transformations—I was simply lost for I didn't know where to stop or how to stop! (Sadly, I still don't!) My whole semester was essentially taken up by that one single "easy" course! In addition, I never even saw a histogram or stem-leaf plot before coming to Harvard. I still recall Don's puzzling expression when I asked him about a stem-leaf plot ...*

Speaking of puzzlement, I still recall that the first time I sat in Don's data analysis seminar course, he was talking about U.S. census. I was so puzzled. What is so hard about counting people that it would need a Harvard professor to lecture on it? Although I hesitated to speak then because of my very poor English, I couldn't conceal my puzzlement – I raised my hand: "Prof. Rubin, in China, the counting is easy -- everybody has a number!" Don looked at me and then announced to the rest of the class: "Xiao-Li is very innocent!" Thankfully, Shaw-Hua, who also sat in, came to my rescue: "Oh, Don, I know what Xiao-Li means – in Taiwan it is even easier – we have a curfew!" I guess you can see now how little real-life statistics I knew then ...

Time for everything

You have a very distinguished career in the statistics field: you won the COPSS Award in 2001, you are the co-editor of *Statistica Sinica*, the chairman of the Statistics Department at Harvard, and now a candidate for the vice-presidency of the ASA. You have also mentored sixteen doctorate students and two post-docs, all of who admire your dedication and selflessness when it comes to spending time with them. You have authored over 70 papers, and have collaborators all over the world. My first question: how do you find the time to do all these things and do them well?

XLM: *Well, time is a relative concept, especially when the boundary between work and leisure time is a blurred one. For example, I often take reviewing articles as my "relaxing time" for I enjoy learning what others are doing. If I have any secret for finding time, it is that I am very efficient in bed—the moment I hit the pillow, I am gone! (Laughter.) I also love doing research while on the road – airplanes and hotels are really ideal environments for deep thoughts for there is little distraction that I need to pay attention to. Perhaps being a people person also helps -- I enjoy talking to and communicating with people, so I usually do not feel much of a burden when dealing with a departmental matter or a journal issue. I just feel lucky to be able to do all the things I love to do, and even get paid for some of them!*

Prof. Meng has been known as very unselfish with his time and effort when it comes to helping graduate students. One of his graduate students from the University of Chicago, Radu Craiu (now an assistant professor at the University of Toronto) recalls fondly his graduate student days. He would often find Xiao-Li working around midnight in his office. Radu recalls: "Xiao-Li has truly brought the meaning of 'my office door is always open for my graduate students' to a new level. He once had a meeting with me that started at 11pm and ended at 1am. He has never given me the boot no matter how busy he was or how late I was in his office!" And many graduate students from the University of Chicago would agree.

And Xiao-Li has always had time for other kind of problems as well – he was always there to motivate and help a student through a rough patch when one would come. We all had moments when we would get stuck on a problem and unavoidably get depressed. Xiao-Li had an uncanny ability to sense the "down times" and he would always come up with something to make everyone feel better. Again, Radu remembers: "He had one of the best encouragements for everyone: 'Just think about it logically: the harder the problem, the better we will feel when we solve it!' And this kind of care did not stop after graduation – I think Xiao-Li finds great pride in the accomplishments of his students and I have always felt that in his encouragement and help after graduation."

When Xiao-Li was invited to give a talk about George Tiao in honor of his 70th birthday at the ICSA Applied Statistics Symposium in San Diego, he kept coming back to the endless generosity and mentorship that Prof. Tiao has given not only to his students but also younger colleagues. There is a saying in Chinese that describes someone generous as "willing to give you the shirt off his back". I think each one of us who worked with Xiao-Li could say the exact same thing about him as well.

Love thy work and thou shall have fun -- *What falls?*

Prof. Meng has won an award for excellence in graduate teaching at the University of Chicago, and has not only taught but also inspired a number of students to pursue statistics. His passion for statistics is contagious, and it is hard not to get completely engrossed in the subject when working with him. The lessons we got from Xiao-Li on several occasions were so memorable and we still tell them to friends today.

In fact, Radu Craiu has reminded me of one of such occasions, when both of us were attending the Workshop on Monte Carlo Methods organized by the Fields Institute and the University of Toronto. We had both just started our graduate studies, and were very happy when, after days of lectures on perfect sampling, Xiao-Li proposed to take us to see Niagara Falls… Alas, there was an interesting random walk mentioned at one of the lectures that afternoon, and while driving us to the Falls, Xiao-Li started thinking out loud about the limiting distribution of that random walk. As we approached Niagara Falls, the proof was getting clearer and the discussion more heated, as Xiao-Li was writing on any available piece of paper we could find around. So here we were, for the first time at the magnificent Niagara Falls, trying to figure out the stationary distribution of a random walk on a finite state space with semi-absorbent edges… And despite the distraction offered by the Falls, we made it! (And we even have some photos to prove it!)

Deep thinking with Vanja, Niagara Falls, Canadian Side, October 26, 1998

… and with Radu – Am I right?

Xiao-Li is a true perfectionist in his work, and he likes not only the correct proofs – he insists on elegant proofs. He has spent, well, years sometimes on certain concepts, and he tries to instill that in all his students. He always likes to tell a story about one of the theorems in his thesis (the rate of convergence of the ECM algorithm). It took him 5 days, without much sleep, to prove the theorem. And not because he couldn't do it in less time, but because he couldn't come up with a nice enough intuition behind the proof, that kept him up for 5 days. It turned out actually that the first proof was wrong, and getting the right intuition actually revealed the error! Xiao-Li recalls how amazed he was that his advisor, Don Rubin, after just having glanced at the proof simply said "Can't be!" which turned out to be right. He has insisted, since then, that the right intuition is as important as the right proof.

Social Scene

VMD: You have always been a great supporter of fun and socializing. Social life seems to play a large part in your life, and you always try to involve graduate students.

XLM: *Well, besides that obviously everyone likes to have fun, I am a big believer that a fun social environment helps to increase people's efficiency, be it for studying or for research. I'm therefore doing as much as I can to encourage and organize social activities in my department. In the past one and half*

years, we have had several Applied Probability Evenings (i.e., poker), an Applied Statistics Evening (i.e., Bowling), a movie night (with free entrance for anyone who has ever used or will use any data), and two holiday parties with talent shows with music and comedy performances... Everybody enjoys work more that way, and it is very rewarding.

Hosting a Holiday Party at Harvard Statistics Department, December 15, 2004

Favorite pastimes

VMD: One of the first impressions you leave on people is that you love your work, so this may be a tough question for you. What do you enjoy the most about it?

XLM: *I love teaching, giving talks and brainstorming with students and collaborators the most. When I travel to work with friends, I actually get more done than when I stay in my office. Of course, I also enjoy immensely coming up with fun titles!*

VMD: How about your non-academic interests? You are well known for you love for food, wine, karaoke, and fishing!

XLM: I should tell you my favorite fishing story. I went to visit Andrew Gelman, then at Berkeley, in the early nineties. Andrew decided to take me fishing, as he knew that I really like to fish and back in Boston we used to catch a lot of fish together. So Andrew had a high expectation. However, fishing is one of those highly uncertain activities, especially when you try a new location. So as it happened, two of us only caught one trout—I gather you can guess who was the master. (Laughter.) On our way back, Andrew said he wanted to stop by a local fish market. I was very curious, so I asked "Why?" "Well, since we always catch so much fish, I expected we would do the same today so I invited quite a few friends tonight to have a fish dinner party. But now we only have one fish …" So to save the day (and our reputation!) we visited the local fish market, and Andrew made a lot of fish cakes after we got back to his apartment. Guess what? Those fish cakes fed Andrew for an entire week because shortly before the dinner time, a serious thunderstorm developed, so only Mary Sara Mcpeek (who was a Ph.D. student at Berkeley then) and her friend showed up! A great story, and lesson, about why prediction is so hard, especially if it is about future! (Laughter.)

And I do enjoy wine, greatly. I find it goes really well with statistics—in statistics, I pursue simplicity; in wine, I seek complexity …   And nothing is more intoxicating than brainstorming with an inquisitive mind over a glass of silky velvet …

Bridging fields

VMD: There seems to be so many things you are interested in. Currently you are working on so many projects, including perfect sampling, fractals, wavelets, biostatistics, mental health survey, digital camera demosaicing, and astrophysics …

XLM: I love being involved and learning about many different things. I am more fascinated by things that I know less about, and to me the greatest perk of being a statistician is what Tukey put succinctly: we get to play in everyone's back yard—actually these days we get to play in some of the front yards as well! And at places like Chicago and Harvard, one is surrounded by extremely intelligent people working on all sorts of fascinating topics. So I certainly would not let my curiosity remain only as such, even if that means that I need to be even more efficient in bed! (Laughter.) Even rediscovering someone else's methods, but from a statistician's perspective, can be extremely rewarding. For example, I was very proud of the bridge sampling and path sampling developed jointly with Wing Wong and Andrew Gelman. I was even more so when Andrew and I discovered that both were actually among the most powerful Monte Carlo methods that physicists have been using for years, because that means that we were as creative as some great physicists! (Laughter.)

But Prof. Meng is also interested in trying new things outside of academia. He has always, for example, been interested in trying exotic foods, tasting funky new wine, or even tackling the slopes of Italian Alps in Bormio without ever having skied before. Prof. Jeff Rosenthal (University of Toronto) has reminded us of a story about Xiao-Li's first skiing experience while at the MCMSki conference in January of 2005, when he decided to strap on a pair of skis and get to the top of a slope to ski down. We won't reveal what happened afterwards, but only that there were no missing parts of Xiao-Li that we needed to impute at the end of the day. But those kinds of curiosity have always followed Xiao-Li around.

Concluding remarks

VMD: So what are you most favorite aspects of being a statistician?

XLM: *As I said, being able to work on seemingly unrelated topics, interacting with great people from many fields, and learning something new and exciting almost every day!*

VMD: What is your least favorite aspect?

XLM: *The fact that statisticians prove the same theorems as economists, but have no chance for Nobel prizes; and that we sometimes have the same reputation as the lawyers, but are far less compensated for that! (Laughter)*

VMD: So what can you say to the future generation of junior statisticians?

XLM: *Really, just do it -- it's fun!! Also, drink more and sleep less ...*

Brainstorming with Vanja and Dan Nicolae (University of Chicago), at 2004 ENAR

and more brainstorming with Radu and Dan …